Lawrence Livermore National Laboratory

Environmental Protection Department

November 28, 2005

Andrew Berna-Hicks
Hazardous Substances Engineer
Standardized Permits and Corrective Action Branch
Department of Toxic Substances Control
700 Heinz Ave
Berkeley, California 94710-2737

Subject: **Technical Notice of Deficiencies, Part A and Part B Permit Application For Hazardous Waste Treatment and Storage Facilities, June 2005 Lawrence Livermore National Laboratory (LLNL) Site 300, Tracy, California (EPA ID No. CA2890090002)**

Dear Mr. Berna-Hicks:

Attached please find the responses to your Notice of Deficiencies (NODs) letter regarding the Lawrence Livermore National Laboratory (LLNL) Site 300 permit renewal application dated September 21, 2005, (Attachment 1). For ease of review, the following is included,

- Your comments and recommendations in italic font, followed by responses, and
- An annotated copy of the revised permit application showing additions in blue font and deletions in strike through red font.

If you have any questions regarding this submittal please contact Stan Terusaki of my staff at (925) 422-1539.

Sincerely,

Ellen Raber

Ellen Raber
Department Head

ER/MA:cp

Attachments:
Attachment 1 Response to Notice of Deficiency dated November 18, 2004

cc w/o attachments:
Sal Ciriello, DTSC, Berkeley Office

Part II. Facility Location

1. *Please provide an 8 by 10 scaled drawing of Site 300 with the approximate locations of all hazardous waste units. Show major roads within and at the perimeter of Site 300. A drawing similar to Figure II-A-5 would be appropriate. There are eleven (11) hazardous waste storage or treatment units for which the locations should be indicated. Direct labeling of the map with numbers, and a legend to one side with the full name of the unit would be appropriate. The units are:*

   Unit 1: Container Storage Area Building 883
   Unit 2: Explosive Waste Storage – Magazine #2
   Unit 3: Explosive Waste Storage - Magazine #3
   Unit 4: Explosive Waste Storage - Magazine #4
   Unit 5: Explosive Waste Storage - Magazine #5
   Unit 6: Explosive Waste Storage – Building 816
   Unit 7: Explosive Waste Storage – Open Detonation Area
   Unit 8: Explosive Waste Storage – Open Burn Area
   Unit 9: Explosive Waste Treatment – Open Detonation
   Unit 10: Explosive Waste Treatment – Open Burn Pan
   Unit 11: Explosive Waste Treatment – Open Burn Cage

Response: Please see Figure III-A-18. A legend has been included consistent with table A of the Part A application. The Operation plan, Part II Section 1, and Appendix II-A have been revised to include the figure as figure II.A-18.

Part IV. Facility Design and Operations

1. *The description of Magazines #3 and #4 on page IV-3 states that the floors, roof and walls are constructed of 1 foot thick reinforced concrete, while the drawings indicate that these components are 10 inches thick. Please indicate which is correct.*

Response: The front walls of the magazines are constructed of 1-foot thick reinforced concrete. Other walls, floors and the roof of the magazines are constructed of 10" thick reinforced concrete. Part IV Section 1.2.1 has been revised.

2. *Do Magazines #2 and #5 have ventilation structures? There is no mention of ventilation in the description given in section 1.2.2 of the Operation Plan.*

Response: Magazine #5 includes a passive ventilation system and Magazine #2 does not have enhanced ventilation. Part IV, Section 1.2.2.2 has been revised to include the information.

3. *Do Magazines #3, #4 or Building #816 have floor drains?*

Response: As stated in Part IV, section 1.2.1.3 Magazines #3 and #4 do not have floor drains. Magazine 816 does not have any floor drains either. Operation plan Part IV, section 1.2.3.1 has been revised to include the information for Magazine 816.

4. *Indicate the maximum size and types of containers that can be safely and practicably placed in each container storage unit. Include maximum size and types for each unit (Magazines 2-3-4-5; Bldg. 813; OD storage cabinet; EWTF storage cabinet; Container Storage Area 883.)*

Response: Table 12 in section 3 of the Operation Plan, Waste Analysis Plan, lists the container types, UN specifications and the waste types that can be stored in the container. The following table indicates the range of container sizes that can be stored in each container storage area.

Unit	Range of container size
Container Storage Area Building 883	Small lecture bottles to 600 gallon portable tanks and boxes up to 4'X4'X7' in size.
EWSF - Magazine 2	55-gallon drums and boxes up to 14 gallons in size. Includes tote boxes.
EWSF - Magazine 3	55-gallon drums and boxes up to 14 gallons in size. Includes tote boxes.
EWSF - Magazine 4	55-gallon drums and boxes up to 14 gallons in size. Includes tote boxes.
EWSF - Magazine 5	55-gallon drums and boxes up to 14 gallons in size. Includes tote boxes.
EWSF - Magazine 816	55-gallon drums.
EWTF - Storage Area 1	30 to 55-gallon drums.
EWTF - Storage Area 2	30 to 55-gallon drums.

5. *Indicate the maximum storage capacity of each storage unit. Note that the Part B needs to specifically indicate storage capacities. Provide a detailed floor plan lay-out (include measurements) of all subunits, including aisle spaces and set backs from walls and justify the maximum storage capacity based on space constraints, shelf area, stacking limitations (are containers stacked?), and limitations on secondary containment. State the maximum storage capacity in gallons for those subunits where liquids may be stored, and in cubic feet for subunits where only solid waste is stored. In addition, include limitations based on tonnage where DOD/DOE regulations address this issue for explosive or reactive wastes.*

Response: In general, the container storage areas have more capacity based on space and secondary containment than "permitted capacity". For explosives wastes, the capacity is determined based on explosives safety and the DOE requirements.

The following table lists the storage units and their capacities. This information can be found in Table A of the Part A Permit Application. It is a convention that explosives wastes are measured in pounds and other LLNL explosives waste related documents follow this convention. Also, since EWTF storage area 1 and 2, and EWSF Magazine 816 store solid wastes in drums, the capacity is listed in gallons for convenience and ease of operations. The waste storage capacities have been converted to cubic feet in the following table for your information.

Unit	Capacity
EWTF Storage Area 1 S01	275 gal = 36.8 cubic feet
EWTF Storage Area 2 S01	110 gal = 14.7 cubic feet
EWSF Magazine 2 S01	3209 lb
EWSF Magazine 3 S01	5592 lb
EWSF Magazine 4 S01	4291 lb
EWSF Magazine 5 S01	2744 lb
EWSF Magazine 816 S01	9240 gal = 1,235 cubic feet
B883 CSA S01	5500 gal OK double figured

Section IV, Facility Design, section provides the dimensions and other details of the units. Figures IV-1, IV-4, IV-5, IV-6, IV-8, and IV-9 provide details about the units. The figures also provide typical container arrangement and shelf detail for B883 and Magazines 2 through 5, respectively. Magazines 2 through 5 are provided with 2 sets of shelves in the arrangements shown in the above-mentioned figures.

Part VI section 2.6.3 outlines the aisle space requirements and stacking height requirements.

Solid wastes are stored in 55-gallon drums in Magazine 816. The drums are arranged in a way that minimum width of main emergency aisles are maintained at 3 feet and the secondary aisle spaces are maintained at minimum of 2.5 feet. Figure IV-16 has been included to show a typical container arrangement configuration.

6. *What is the storage capacity of the chemical locker within Storage Area 883?*

Response: As stated in Part IV, section 1.1.2, the storage locker has the capacity to hold six 55-gallon drums.

7. *Is the maximum treatment capacity for the Open Burn Area 350 pounds per day, or per event? How many events per day?*

Response: The maximum capacities for EWTF Burn Pan and EWTF Burn Cage are 100 lb and 260 lb per event per day respectively. For the days that treatments occur, there will be no more than one event per day.

8. *Is the maximum treatment capacity for the Open Detonation Area 100 pounds per day, or per event? How many events per day?*

Response: The maximum capacity for EWTF Detonation Pad is 350 lb. per event per day. For the days that treatments occur, there will be no more than one event per day.

Part VI. Management Practices

1. *Section 2.4.6 mentions the method for segregating incompatible wastes. What are the procedures for determining incompatible wastes? Provide the procedure and charts. This is especially crucial for management of Storage Area 883 since it uses the pad for secondary containment*

Response: For non-explosive wastes, Building 883 CSA uses a bermed concrete pad to provide secondary containment; however, there are additional requirements, mentioned in Part VI, Section 2.4.6, for storing incompatible wastes. Additional management practices to insure that incompatible wastes are not co-mingled include the following:

- Elevating waste containers on pallets,
- Separating incompatible solid wastes by distance,
- Placing incompatible wastes into overpack containers,
- Providing separate secondary containments by using secondary containment pallets,
- Isolating waste containers in the chemical locker, which has its own separate secondary containment area.

Detailed information regarding segregation of incompatible wastes and containment pallets are provided in section 2.4.6 of Part VI.

Regarding procedures for identifying compatibility information, all wastes are characterized before acceptance into the hazardous waste management units. As a part of the characterization, the compatibility of the wastes are identified and a code is assigned. See sections 3.2, 3.3, 4.33, 4.4.3 and 9 of the Waste Analysis Plan, Part III of the Operation Plan. This compatibility information is based on Hatayama Waste Compatibility System and other appropriate systems, and examples of references used in assigning the compatibility codes are the chemical

compatibility information presented in 40 CFR 264, Appendix IV, "Examples of Potentially Incompatible Waste," and Volume II of the *Chemical Hazard Response Information System* (U.S. Coast Guard, 1986).

Explosive wastes will be segregated for storage on the basis of compatibility with other explosives. Table 8 provides descriptions of DOE explosive storage compatibility groups.

Table 9 is a storage compatibility mixing chart based on DOE storage compatibility groups. This information will be used to determine the storage compatibility of explosive wastes received at the EWSF. Typically, only unrestricted compatible storage groups will be stored in a magazine; however, restricted compatible storage groups (except Groups A, K, L, and N) may be stored together if the net weight of explosives does not exceed 1,000 pounds.

does "restricted" mean incompatible?

Table 8

Description of UNO Storage Compatibility Groups

Group	Description
A	Initiating explosives. Bulk initiating explosives that have the necessary sensitivity to heat, friction, or percussion to make them suitable for use as initiating elements in an explosive train. Examples are wet lead azide, wet mercury fulminate, wet tetracene, dry RDX, and dry PETN.
B	Detonators and similar initiating devices not containing two or more independent safety features. Items containing initiating explosives that are designed to initiate or continue the functioning of an explosive train. Examples are detonators, blasting caps, small arms primers, and fuses.
C	Bulk propellants, propellant propelling charges, and devices containing propellant with or without their means of ignition. Items that upon initiation will deflagrate, explode, or detonate. Examples are single-, double, triple-base and composite propellants, rocket motors (solid propellant), and ammunition with inert projectiles.
D	Black powder, HE, and ammunition/devices containing HE without its own means of initiation and without propelling charge, or a device containing an initiating explosive and containing two or more independent safety features. Ammunition and explosives that can be expected to explode or detonate when any given item or component thereof is initiated except for devices containing initiating explosives with independent safety features. Examples are bulk trinitrotoluene (TNT), Composition B, black powder, wet RDX or PETN, bombs, projectiles, cluster bomb units (CBUs), depth charges, and torpedo warheads.
E	Ammunition/explosives devices containing HE without its own means of initiation and with propelling charge (other than one containing a flammable or hypergolic liquid). Ammunition or devices containing HE and containing propelling charges. Examples are artillery ammunition, rockets, or guided missiles.
F	Ammunition containing HE with its own means of initiation and with propelling charge (other than one containing a flammable or hypergolic liquid) or without propelling charge.

Group	Description
G	Fireworks, illuminating, incendiary and smoke, including hexachlorethane (HC) or tear producing munitions other than those munitions that are water activated or which contain WP or flammable liquid or gel. Ammunition that, upon functioning results in an incendiary, illumination, lachrymatory, smoke, or sound effect. Examples are flares, signals, incendiary or illuminating ammunition, and other smoke or tear producing devices.
H	Ammunition containing both explosives and WP or other pyrophoric material. Ammunition in this group contains fillers that are spontaneously flammable when exposed to the atmosphere. Examples are WP, plasticized white phosphorus (PWP), or other ammunition containing pyrophoric material.
J	Ammunition containing both explosives and flammable liquids or gels. Ammunition in this group contains flammable liquids or gels other than those that are spontaneously flammable when exposed to water or the atmosphere. Examples are liquid- or gel-filled incendiary ammunition, fuel-air explosive (FAE) devices, flammable liquid-fueled missiles, and torpedoes.
K	Ammunition containing both explosives and toxic chemical agents. Ammunition in this group contains chemicals specifically designed for incapacitating effects more severe than lachrymation. Examples are artillery or mortar ammunition (fused or unfused) grenades, and rockets or bombs filled with a lethal or incapacitating chemical agent.
L	Ammunition not included in the other compatibility groups. Ammunition having characteristics that do not permit storage with other types of ammunition, or kinds of explosives, or dissimilar ammunition of this group. Examples are water-activated devices, prepackaged hypergolic liquid-fueled rocket engines, certain FAE devices, triethyl aluminum (TEA), and damaged or suspect ammunition of any group. Types presenting similar hazards may be stored together but not mixed with other groups.
N	Ammunition containing only extremely insensitive detonating substance (EIDS). Examples are bombs and warheads.
S	Ammunition presenting no significant hazard. Ammunition so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not hinder firefighting significantly. Examples are thermal batteries, explosive switches or valves, and other ammunition items packaged to meet the criteria of this group.

Table 9

Storage Compatibility Mixing Chart[3]

Groups	A	B	C	D	E	F	G	H	J	K	L[4]	N	S
A	X	Z											
B	Z	X	Z	Z	Z	Z	Z						X
C		Z	X	X	X	Z	Z						X
D		Z	X	X	X	Z	Z						X
E		Z	X	X	X	Z	Z						X
F		Z	Z	Z	Z	X	Z						X
G		Z	Z	Z	Z	Z	X						X
H								X					X
J									X				X
K										Z			
L[4]													
N			Z	Z	Z							X	X
S		X	X	X	X	X	X	X	X			X	X

[1] An "X" in the above chart indicates that these groups may be combined in storage. Otherwise, mixing is either prohibited or restricted according to item 2, below.

[2] A "Z" in the above chart indicates that when warranted by operational considerations or magazine non-availability, and when safety is not sacrificed, limited quantities of these groups may be combined in storage. These relaxations involving mixed storage are approved by the DOE, as authorized by DOD, and are not considered waivers.

[3] No mark in a block indicates that combined storage is not permitted.

[4]Group L is "ammunition not included in other groups, requiring separate storage requirements, and therefore are not compatible with other groups. Group L can be damaged or suspect ammunition of any group and will be stored separately.

Part III Section 4.4.3 and Part VI Section 2.4.6 of the Operation Plan sections have been revised to include the information.

2. *DTSC finds it appropriate to impose permit restrictions regarding appropriate meteorological conditions at the time of open burn and detonation events to match worse case conditions as stated in the Health Risk Assessment. The following language is proposed for inclusion in the new permit:*

"All treatment activities approved by this Permit (open burns and open detonations) shall be carried out only when meteorological conditions meet the following basic requirements: (to be proposed)"

Propose meteorological limitations on open burn and open detonations based on conditions assumed in preparing the Health Risk Assessment (wind speed, wind direction, high or low temperature, etc.).

Response: The lower limit of wind speeds in the OBODM model used for performing the risk assessment is 1 m/s. Minimum dispersion (and maximum concentration) occurs at low wind speeds. Also, OBODM modeling was limited to times between 7 am and 6 pm. No limits were placed on wind direction, temperature, or precipitation. The following is suggested for permit conditions based on the health risk assessment.

- The permittee shall not perform open burns or open detonation when wind speeds are less than 2 mph (1 m/s).

- The permittee shall not commence open burns or open detonations after 6 pm.

3. *DTSC also intends on adding the following language to the new permit regarding radioactive wastes:*

"No radioactive wastes or wastes containing radioactive constituents, including low level radioactive wastes or constituents, shall be stored or treated in any unit covered by this permit."

Response: LLNL Site 300 generates low level radioactive waste (LLW), low level radioactive waste containing a RCRA hazardous waste constituent (MLLW) and RCRA hazardous waste (HW) as a result of explosives testing. The testing of explosives has been Site 300's primary mission since the facility became operational in 1955.

LLW and MLLW are temporarily stored Building 883 Waste Accumulation Area (B883 WAA), while HW is stored in B883 WAA and Building 883 Container Storage Area (B883 CSA). Building 883 WAA (north side of 883) and B883 CSA

(south side of 883) share a common epoxy-coated concrete foundation (not secondary containment), metal roof, and chain link fencing. A six-foot tall, six-inch thick concrete wall separates the north and south sides of B883.

The storage of MLLW in B883 WAA has not compromised public safety, resulted in a release to the environment (on-site or off-site), or caused injury to facility personnel. The storage of MLLW in B883 CSA, if allowed, would follow the same management programs and procedures that have lead to the safe storage of MLLW in B883 WAA. Treatment of MLLW would not occur in B883 CSA or B883 WAA. Waste management programs and procedures would be reviewed annually, at a minimum, to ensure administrative documents (i.e., programs, procedures, Part A/B permit application) provide the necessary controls to conduct all facility operations in a safe and efficient manner.

Part IX. Closure Plan

1. *Risk based closure performance standards may be applied to soils and groundwater, and certain structural members of the hazardous waste units, including concrete flooring. Please add the following language to the Closure Plan: "Determination of closure performance standards shall be developed and approved by DTSC based on DTSC approved risk assessment methodology immediately prior to initiating closure."*

Response: Part IX, Section 1.4 has been revised to include the suggested statement language.

2. *Wipe sampling may be used to determine whether performance standards have been achieved for concrete flooring and other structural members. Please add the following language to the Closure Plan: "Detailed wipe sampling procedures, including the type of filter paper and solvent used, analysis testing methodology and laboratory detection limits shall be pre-approved by DTSC before proceeding with closure."*

Response: Part IX, Appendix A-1 Section 2, Appendix A-2 Section 2, and Appendix A-3 Section 2 have been revised to include the suggested statement language.

3. *Core sampling of concrete flooring and underlying soils will be required for all units with concrete floors. Please add the following language to the Closure Plan:* ***"Concrete core sample analysis testing methodology, scope of analysis, and laboratory detection limits shall be pre-approved by DTSC before initiation of closure activities."***

Response: Part IX, Appendix A-1 Section 2, Appendix A-2 Section 2, and Appendix A-3 Section 2 have been revised to include the suggested statement language.

4. *Areas of concrete where contamination has occurred may be excised from the pad if a proper testing scheme has been developed to assure removal of all contamination.*

Response: Part IX, Appendix A-1 Section 2, Appendix A-2 Section 2, and Appendix A-3 Section 2 have been revised to include the suggested statement language.

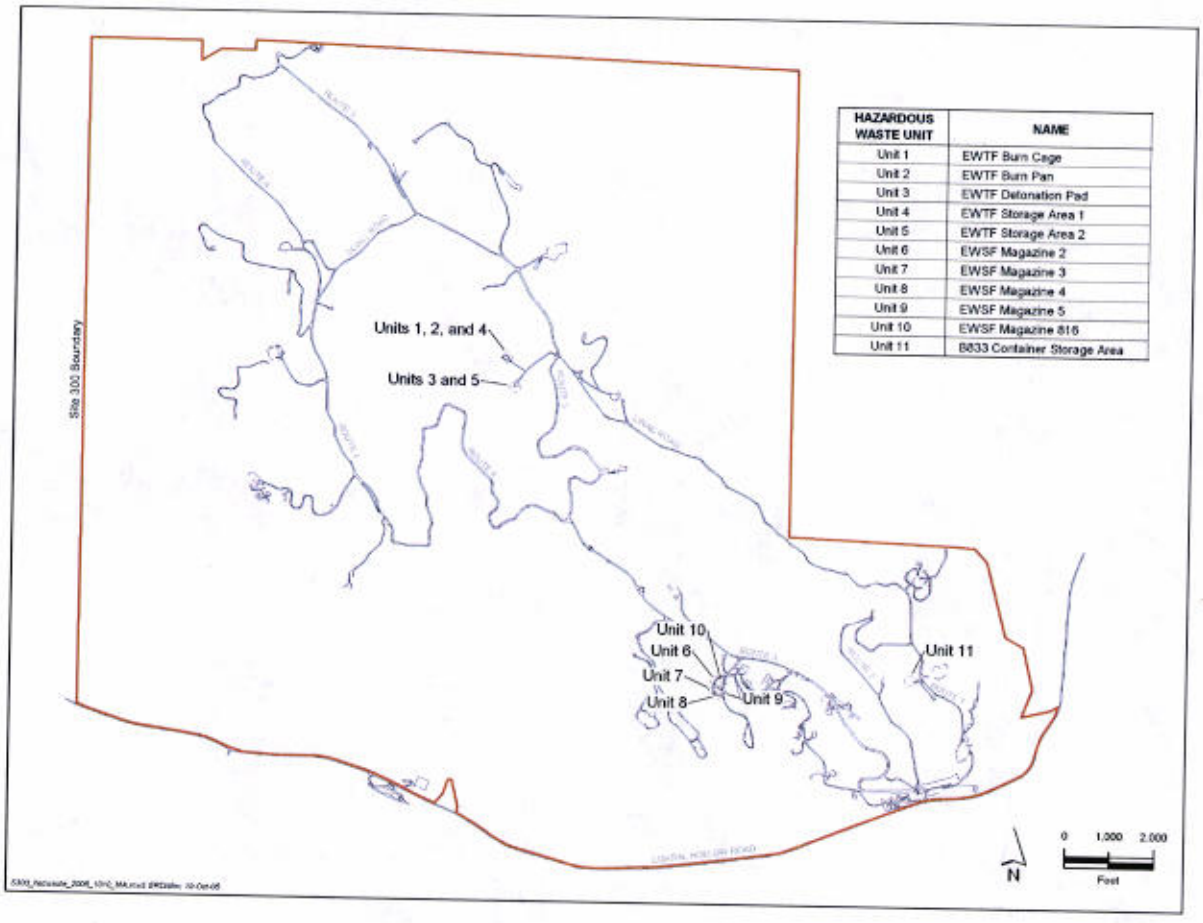

Figure II.A-18. Locations of Hazardous Waste Units

Part II

Facility Location

PART II FACILITY LOCATION

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The Explosive Process Area is located in the southeast portion of Site 300. It contains the equipment needed to press and machine explosives. Explosive components are assembled and disassembled in this area. Other operations conducted in this area include explosives characterization and radiography. The Explosives Waste Storage Facility is located in the HE Process Area.

Pit 6 is a closed former landfill that covers 2.4 acres of this area. Pit 6 operated from 1964 to 1973 and received wastes from Lawrence Berkeley Laboratory and the LLNL main site at Livermore. Since closure, the Pit 6 area has been used as a rifle range by LLNL Safeguards and Security Department and by the police forces from San Joaquin County, the state of California, and the federal government. A Weapons Test Area is also located in the northwest portion of the Pit 6 Area.

The East and West Firing Areas are used for explosive experiments and hydrodynamics diagnostics. The EWTF is located in the East Firing Area.

1 Detailed Maps

Detailed maps providing general information on the LLNL Site 300 location are provided in **Appendix II-A** of this permit application. The maps in **Appendix II-A** have scales, dates, and north arrows. These maps are listed in **Table II-1** and briefly discussed in this part.

Figure II.A-1 is a regional location map showing the approximate location of Site 300 and its proximity to LLNL's Livermore site and urban areas. **Figures II.A-2, -6, -7**, and **-8** are topographic survey maps for the Hazardous Waste Management Facilities (B883 CSA, EWSF, and EWTF) in this permit application. **Figures II.A-3** and **-4** show the locations of EWSF, EWTF, and B883 CAS in relation to other Site 300 facilities. Internal roads are shown on **Figure II.A-4, -5, -6, -7**, and **-8**.

No injection wells are located at the LLNL Site 300. Supply wells, LLNL monitoring wells, extraction wells, and piezometers at LLNL Site 300 are shown on **Figure II.A-9**. Environmental monitoring devices and sampling locations are presented in **Figure II.A-10**.

A wind rose showing the average annual wind direction and speed during 2004 is shown on **Figures II.A-11**. At Site 300, the prevailing winds are from the west-southwest.

Figure II.A-12 shows the land use for the area surrounding Site 300. Most of the land surrounding LLNL Site 300 is agricultural (primarily for grazing cattle and sheep). Two other smaller, privately operated research and testing facilities are located near Site 300. The property east of and adjacent to Site 300 is now owned by Fireworks America and is currently being used to store pyrotechnics. A portion of the property is leased to Reynolds Initiator Systems, Inc., and is used to manufacture initiators, which are agents that cause a chemical reaction to commence.

SRI International operates an explosives test facility approximately 0.6 miles south of Site 300.

Table II-1. List of Part II Maps

Figure	Title
II.A-1	Regional Location Map
II.A-2	U.S. Geological Survey (USGS) Topographical Map
II.A-3	Site 300 EWTF
II.A-4	LLNL Site 300 Map and Building Index
II.A-5	LLNL Site 300 Activity Areas
II.A-6	Building 883 Container Storage Area Topographic Survey Map
II.A-7	Explosive Waste Storage Facility Topographic Survey Map
II.A-8	Explosive Waste Treatment Facility Topographic Survey Map
II.A-9	Well Location Map, Site 300
II.A-10	Air Particulate Sampling Locations, Site 300
II.A-11	Wind Rose, Site 300
II.A-12	Land Use Map for LLNL Site 300 and Vicinity
II.A-13	LLNL Site 300 Boundary Map
II.A-14	Geologic Map of Site 300
II.A-15	Potentiometric Surface Elevation Map of Major Water-Bearing Units at Site 300
II.A-16a	Flood Insurance Rate Map, Panel 700
II.A-16b	Flood Insurance Rate Map, Panel 715
II.A-17	Flood Insurance Rate Map with the EWTF, EWSF, and B883 CSA
II.A-18	Hazardous Waste Management Unit Location Map

Corral Hollow Road borders Site 300 on the south. South of the western portion of Site 300, across Corral Hollow Road, is the Carnegie State Vehicle Recreation Area, covering approximately 5000 acres. This outdoor recreational facility is operated by the California Department of Parks and Recreation Off-Highway Motor Vehicle Recreation Division for the exclusive use of off-highway vehicles.

The nearest urban area is the City of Tracy, approximately 2 miles northeast of Site 300. Rural residences are located along Corral Hollow Road, west of Site 300 and the Carnegie State Vehicular Recreation Area. Power-generating wind turbines occupy the land northwest of the site.

No easements at the LLNL Site 300 have been given to non-LLNL parties.

Legal boundaries for the LLNL Site 300 are shown on **Figure II.A-13** and are described further in **Part II.2.1**. **Figures II.A-14** and **II.A-15** show a geologic map and a potentiometric surface elevation map of the major water-bearing units at Site 300, respectively. Administrative access controls, security, and unit-specific access controls are discussed in detail in **Part V** of this permit application.

The locations of hazardous waste management units are shown on **Figure II.A-18.**

APPENDIX II-A
HAZARDOUS WASTE MANAGEMENT FACILITIES
FIGURES

APPENDIX II-A HAZARDOUS WASTE MANAGEMENT FACILITIES DRAWINGS

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Part III

Waste Characteristics

Environmental Protection Department
Operations and Regulatory Affairs Division

Waste Analysis Plan for Hazardous Waste Treatment and Storage Facilities, Site 300

~~January 2005~~revised November 2005

Lawrence Livermore National Laboratory
University of California Livermore, California 94551

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waste management facilities or which affect the definition of hazardous waste, resulting in an increase in the number or types of hazardous waste managed at the facility.

1.4 Document Structure

Section 2 of this WAP provides a general site description of LLNL, an overview of the LLNL programs, directorates, departments, and/or divisions that generate waste, and the types of waste generated. This section also explains how form codes (listed in **Table 1**), source codes (**Table 2**), and waste forms (**Table 3**) are used in characterizing LLNL's waste streams. Note that all tables and figures follow the text. Section 2 also provides an overview of the RHWM Division, the CMS waste management group, and the Site 300 hazardous waste management facilities.

Section 3 gives an overview of the process of managing hazardous waste and the waste characterization documentation, focusing in particular on the Waste Disposal Requisition (WDR).

Section 4 discusses the hazardous waste management process in detail from the point that the generator offers the waste for transfer to the acceptance of the waste at a permitted facility.

Section 5 explains how personnel from RHWM Division select the parameters of concern used in the waste characterization process and the analytical test methods. ~~Table 8~~Table 10 (all tables and figures follow the text) provides the rationale for choosing parameters and SW-846 test methods. ~~Table 9~~Table 11 lists the non-state-certified tests that are used in waste verification.

Section 6 explains how RHWM personnel conduct waste sampling, how sampling methods are chosen, and how quality assurance/quality controls, precision and accuracy, and chain of custody are incorporated into sampling. **Table 1~~0~~2** specifies sample storage instructions. **Table 1~~1~~3** lists the selected sampling methods and devices.

Section 7 describes the selection of analytical laboratories. **Section 8** discusses the internal profile development process.

Section 9 discusses the storage of hazardous waste through segregation by compatibility. **Sections 10** and **11** provide discussion of hazardous waste treatment and post-treatment characterization, respectively.

Record keeping is the subject of **Section 12**. Records and documents include Waste Evaluation Forms, WDRs, WDR Templates, usage cards, accumulation logbooks, analytical data, Nonconformance Corrective Action Reports, and RHWM Waste Disposal Requisition Change Requests and any other information relevant to waste characterization and acceptance.

and that the generator has signed the WDR Template. In the case of non-explosives wastes, RHWM personnel verify that the required tests for conditionally profiled wastes and that any fingerprint verification tests are being (or have been) conducted.

In the case of the B883 CSA, the RHWM field technicians will segregate and store the waste based on the compatibility code.

Explosive wastes will be segregated for storage on the basis of compatibility with other explosives. **Table 8** provides descriptions of DOE explosive storage compatibility groups.

Table 9 is a storage compatibility mixing chart based on DOE storage compatibility groups. This information will be used to determine the storage compatibility of explosive wastes received at the EWSF. Typically, only unrestricted compatible storage groups will be stored in a magazine; however, restricted compatible storage groups (except Groups A, K, L, and N) may be stored together if the net weight of explosives does not exceed 1,000 pounds.

4.5 Frequency of Analysis of Non-explosives Waste

For non-explosives wastes, a generator's performance and reliability are monitored through either full-scale analysis or fingerprint analysis. Full-scale analysis is conducted as necessary to ensure that waste characterization is accurate and up-to-date. A waste stream with an existing waste profile is verified for accuracy by fingerprint analysis at least once per year.

At a minimum, RHWM personnel initiate or repeat analysis whenever:

- A generator has generated a new waste stream that RHWM will receive for the first time unless a sampling exemption applies.
- RHWM personnel have reason to believe that the process or operation generating the waste has changed.
- Fingerprint analytical results are inconclusive or do not match the waste profile, WDR information, or previous analytical data.

5 Parameter Selection and Analytical Methods for Non-explosives Waste

Non-explosives waste is sampled and analyzed for parameters of concern. A parameter of concern is either (1) a physical property that needs to be examined so that a determination can be made regarding the waste's toxicity, corrosivity, ignitability, or reactivity, or (2) a chemical constituent whose presence would render a waste to be hazardous if present at or above the regulatory level. Physical properties and chemical constituents have been identified as parameters of concern through examination of the following regulations:

- Title 40 of the Code of Federal Regulations, Part 261 (40 CFR 261).
- Title 22 of the California Code of Regulations, Chapter 11, Section 66261 (22 CCR 66261).

By comparing the waste's form code with its matching description and associated chemical constituents (see **Table 1**) to the physical properties and chemical constituents listed in the regulations, the appropriate parameters of concern for each waste stream are identified. In turn, suitable analytical methods are assigned to analyze the waste for that parameter. ~~Table 8~~Table 10 lists the parameters and full-scale and fingerprint analysis test methods for each form code. For full-scale analysis, EPA analytical methods from EPA's *Test Methods for Evaluating Solid Waste, SW-846* (most recent edition) are specified. For fingerprint analysis, other test methods may be specified (as described in **Section 5.2**).

5.1 Parameter Selection

The rationale for choosing the parameters and test methods includes the following:

- Determine if a waste exhibits the hazardous waste characteristics of ignitability, corrosivity, reactivity, or toxicity, or if it is an RCRA-listed waste or a California-only hazardous waste.
- Meet waste acceptance criteria of permitted waste management facilities and offsite TSDFs.
- Characterize the waste for proper and safe packaging and onsite storage or treatment of wastes.
- Determine if a waste complies with the federal and state LDR requirements.

The RHWM Characterization Chemist reviews the source code and the chemical and physical properties recorded on the WDR. Using the parameters and the test methods for each form code (as listed in ~~Table 8~~Table 10), the Characterization Chemist then selects the actual parameter(s) of concern for which a particular waste will be analyzed. Adjustment of the parameters is acceptable, if either the SW-846 test methods or the fingerprint test methods listed in ~~Table 9~~Table 11 are used.

5.2 Fingerprint Analysis for Non-explosives Waste

Fingerprint analysis for non-explosives wastes identifies select physical properties or chemical constituents present in the waste. It typically involves screening and non-certified analyses, and it utilizes both field and laboratory-based protocols.

The fingerprint tests utilized at LLNL involve such analyses as visual inspections, radioactivity screening, pH/normality measurements, peroxide tests, oxidizer/reducer screening, water reactivity tests, paint filter tests, sulfides/cyanides tests, flash point testing, metals analysis, and solvent screening. The analyses typically involve American Society for Testing and Materials (ASTM) methods and make use of such

instrumentation as pH meters, Geiger counters/liquid scintillation counter, spectrophotometer for calorimetric-based assays, surface acoustic wave gas chromatographs for detection of volatile organic compounds, and flash point tester. EPA methods (e.g., SW-846/9040, 9041), such as those for pH measurements, may be utilized as well.

5.3 Detection Limits of Analytical Methods

For all full-scale analytical methods, the detection limits are determined by EPA-required methods. For the California Assessment Manual (CAM) metals Total Threshold Limit Concentration (TTLC) and the Waste Extraction Test (WET), the detection limits achieved by a laboratory must be below the regulatory thresholds for the chemical constituents in samples extracted using the WET method. For all other chemical constituents that do not have an established regulatory threshold, the EPA-required analytical method detection limit is used.

For fingerprint analyses, the methods specified in **Tables ~~8~~ 10** and ~~9~~ **11** encompass the regulatory level of hazardous constituents and properties; consequently, a determination can be made as to whether the level of a specific parameter of concern present in the waste will cause the waste to be hazardous.

5.4 Quality Assurance/Quality Control for Analytical Methods

LLNL Site 300 uses California state-certified laboratories to analyze waste samples for waste characterization. (California state-certified laboratories may be physically located in California itself or in another state.) These laboratories use quality assurance/quality control (QA/QC) criteria derived from *Test Methods for Evaluating Solid Waste, SW-846* (EPA, most current edition) to maintain the accuracy and precision of reported analytical data.

Fingerprint analysis also follows criteria derived from *Test Methods for Evaluating Solid Waste, SW-846* (EPA, most recent edition) but is tailored to meet the requirements of both physical and chemical fingerprint analysis. Protocols differ from those used in California state-certified laboratories, but they are defensible and follow standard QA/QC protocols, including control charts, calibration curves, log books, and sample tracking mechanisms.

LLNL closely monitors the analytical performance of each laboratory that it uses for full-scale analyses. Monitored items include the laboratory's QA/QC program, its accreditation status, and its instrument calibration and repair records to ensure properly functioning equipment. Data quality is evaluated in terms of precision, accuracy, completeness, representativeness, and comparability. These terms—as used at LLNL—are defined below.

- ***Precision*** is a measure of data reproducibility. It is assessed by replicate measurements of reference materials, samples, or method performance samples. For any data reported, LLNL reviews such QC parameters as standard deviation (SD),

relative standard deviation (RSD), relative percent difference (RPD), and coefficient of variation (CV) to determine its precision.

- ***Accuracy*** is the degree of agreement of a measured value and that of an accepted reference or true value. Accuracy is assessed using percent recovery (%R). As part of its data audit, LLNL verifies that the outside laboratory used spikes in samples, controls, and blanks to maximize the accuracy of reported data.
- ***Representativeness*** is the degree to which data accurately and precisely represents a characteristic of a population. LLNL verifies that reported analytical data are the same regardless of the heterogeneity of the original sample matrix.
- ***Completeness*** is a measurement of the amount of valid data obtained from an analytical system compared with the amount expected under correct normal conditions. Again, LLNL evaluates data from outside laboratories to establish the QC check analyses needed to verify the precision and accuracy of the analytical protocol.
- ***Comparability*** is the confidence with which one data set can be compared to another data set measuring the same property. Comparability is assured through the use of approved analytical methods (e.g., SW-846 methods), consistencies in the basis of analysis (e.g., weight or volume), and reporting units. LLNL verifies all these for each set of data from certified laboratories.

5.5 Parameter Selection and Analytical Methods for Special Cases

LLNL sometimes encounters special situations that require the use of unique parameter suites and analytical methods. These situations include spills, rainwater analysis, and sewer releases.

5.5.1 Liquids Collected in Secondary Containment Systems of Permitted Units

Accumulated liquids in secondary containment systems or bermed areas are visually detected. When liquids are observed in secondary containment, LLNL personnel investigate to determine whether the liquid resulted from precipitation, decontamination, tap water used for specific purposes, or a possible waste spill or leak.

5.5.1.1 Spilled Liquids and Rain Water

LLNL does not analyze waste liquids resulting from a spill if it can be determined that the spill came from a particular container or tank system whose contents are known and are on record.

Accumulations of liquids known to be non-hazardous (such as tap water used for safety showers), or of liquids of unknown origin (from raw material, waste containers, or tanks), are managed as spilled hazardous or mixed wastes. Liquids are removed and containerized, and a sample is collected and analyzed. RHWM personnel may consult with Operations and Regulatory Affairs Division (ORAD) personnel to determine what analysis is required analysis. The analysis is based upon known or suspected

contaminants in or near the secondary containment, and parameters associated with internal discharge requirements for sanitary sewer discharge.

6 Waste Sampling of Non-explosives Waste

Sampling of non-explosives waste is conducted by RHWM personnel who are trained in sampling. Wastes are sampled at SAAs or WAAs and at the permitted hazardous waste management facilities. Sampling is conducted for waste characterization, verification, and LDR notification/certification. (Explosives wastes are characterized based on generator knowledge and are not sampled.)

6.1 Sampling Objectives

The objective of any sampling event is to collect samples that are representative of the media under investigation. An ideal representative sample is one that accurately and precisely characterizes the population from which it was chosen.

6.2 Sampling Methods

To collect representative waste samples, LLNL uses EPA-approved sampling methods either listed in or which are based upon:

- 40 CFR 261, Appendix I.
- SW-846, Chapter 9 (EPA, most recent edition).
- EPA's *Samplers and Sampling Procedures for Hazardous Waste Streams*, 600/2-80-018 (EPA, 1980).

The sampling methods and devices used are selected on the known physical state, homogeneity, and chemical properties of the waste, as well as the size and type of the waste container or tank. These EPA-based methods, summarized below, are used to sample:

- Containerized and uncontainerized solid wastes, including HEPA filters, PPE, laboratory trash, and debris.
- Liquid wastes in containers or tanks, which are homogeneous or heterogeneous.

~~Table 11~~Table 13 lists the typical sampling devices that are used for sample matrices and container types. **Table 12**4 lists typical containers used in hazardous waste management.

RHWM sampling personnel determine the sampling strategy before sample collection in order to select a method that is appropriate for the waste. Before sampling, personnel involved in waste sampling determine the type of waste to be sampled, requested analysis, minimum quantity and size of the material to collect, appropriate sample container(s), required preservation media, and maximum sample holding time. The sampler also verifies that the laboratory can accept the sample(s).

In addition, sampling personnel determine the appropriate sampling device(s). Before sampling, sampling equipment is inspected for operability. Between each sampling event, sampling devices are decontaminated by rinsing with trisodium phosphate, nitric acid, isopropyl alcohol, and water. Disposable sampling equipment is disposed of after each use without cleaning and, if appropriate, is managed as hazardous waste.

6.2.1 Sampling of Liquids in Containers or Tanks

A Composite Liquid Waste Sampler (COLIWASA) or other approved sampling device is slowly inserted into the contents of a drum or carboy in order to obtain a vertical cross-section of all strata present in the container in their original volume ratio. When multiphasic liquids are sampled, the contents of the sampling device are released into a graduated cylinder to determine the number of phases present and their volume. Sampling information is recorded in the Sampling Log Book. Sampling personnel then calculate and record the volume % of each phase. An aliquot of each phase is then transferred into separate, labeled sample containers. When single-phase liquids are sampled, the contents of the COLIWASA are released directly into a sample container. Preservation material is added to the sample(s) in accordance with **Section 6.6**. The sample container is labeled prior to its leaving the possession of the worker conducting the sampling.

Before liquids in tanks and portable tanks are sampled, the contents are mixed by using either a built-in circulating system or an external portable pump. A sample is taken using an approved sampling device or a fixed sampling port if one is available. The sample is released directly into a sample container. Preservation material is added to the sample(s) in accordance with **Section 6.6**. The sample container is labeled prior to its leaving the possession of the worker conducting the sampling.

6.2.2 Sampling Containerized and Uncontainerized Solids

A coring device or other approved sampling device is used to capture a vertical cross-section of containerized or uncontainerized solids. The entire cored sample is then placed into a sample container, which is labeled prior to leaving the possession of the sampler.

For gloves, booties, and coveralls (such as Tyvek® coveralls), laboratory trash, or debris, several methods can be used to select representative samples. Samples can be selected from equidistant locations within the waste drum or from each bag within the drum. In addition, articles are selected that represent each waste form present in the drum, including items with stains, visible residue, and areas of a waste item which potentially contain the heaviest contamination. Sufficient sample is collected in accordance with the sampling strategy. Sample material is placed into sample container(s), which is labeled prior to leaving the possession of the sampler.

6.3 Sampling Documentation

Sampling activities are documented in logbooks. Logbooks are used to record sampling information, such as:

- Sampling equipment utilized.
- Type and size of sample container.
- Date, time, and location of sampling activity.
- Preservation methods.
- WDR or identification number.
- COC number.
- Description of the waste, and the type and the size of waste container from which the sample was collected.
- Descriptive details of the sample (e.g., quantity and size of the material collected; color, clarity, consistency, etc.).
- Requested analysis.
- Sampling participants.
- Field measurements performed (if applicable).
- Method of transporting samples (e.g., cooler with blue ice, etc.).

Also recorded are field sampling notes, such as was the waste container leaking at the time of sampling? did the waste match the description on the WDR? were there any container discolorations? how full was the waste container? what were the weather conditions?

For mixed waste, the logbook may be supplemented by a Sampling and Analysis Plan or a Sampling and Analysis Worksheet. The Sampling and Analysis Plan is usually directed at a specific disposal site for an initial request for disposal. It captures the waste stream description, requested analytical parameters, sampling frequency, and acquisition strategy or methodology, as well as other specific required disposal site information. A Sampling and Analysis Worksheet is a shortened Sampling and Analysis Plan, as negotiated with the disposal facility. A Sampling and Analysis Plan or Worksheet is typically used for multiple container populations of a non-routine waste stream or legacy waste.

6.4 Representative Sampling

Representative sampling of solids or liquids in single containers or tanks is described in **Section 6.2**. For multiple containers of the same waste stream, the number of containers to be sampled is calculated using the methodologies specified in SW-846 (EPA, most recent edition). These calculations are based on the matrix, population size, and any previous constituent concentrations. The specific drums selected for sampling are determined using a random number generator. For waste in large containers, a population and a number of samples are determined based on the number of calculated sample sites in a grid; subsequent sample locations are then randomly selected.

6.5 Personal Protective Equipment

RHWM sampling personnel consult with LLNL's Hazards Control Department specialists concerning the appropriate PPE required for waste sampling. Hazards Control technical disciplines, including industrial hygienists and health physicists, are trained and equipped to evaluate the needs and specify the proper PPE required for sampling.

6.6 Sample Storage and Preservation

For the EPA analytical methods listed in ~~Table 8~~Table 10, sample storage instructions—such as container types, quantities, preservation, and holding times—are specified in ~~Table 10~~Table 12. RHWM provides sample bottles and preservatives. A sample container compatible with the waste matrix is chosen. Normally, chemical preservatives are not used on waste samples because of the potential for an uncontrolled reaction. Therefore, in accordance with EPA SW-846 (most recent edition), RHWM primarily uses cooling as a means of preserving samples. (The chemical preservatives listed in ~~Table 10~~Table 12 are used primarily on samples collected from treated wastewaters being tested to show compliance with industrial discharge limitations and to demonstrate that hazardous properties are no longer exhibited by the waste.) Samples requiring refrigeration are placed in a cooler or refrigerator immediately upon collection to cool the samples to approximately 4°C.

6.7 Sampling QA/QC

Accurate data on the waste streams are critical for proper handling, storage, and disposal of waste. The objectives of the sampling QA/QC program's goals are:

- Obtain and assure accurate and precise data on the chemical and physical composition of waste streams.
- Identify and mitigate erroneous sampling techniques.

These objectives are accomplished by integrating QA/QC standards into the sample planning process, thereby increasing analytical integrity. QA/QC methods listed in SW-846 (EPA, most recent edition) are followed for sampling.

6.7.1 Precision and Accuracy

Waste samples must accurately reflect generator waste streams. To verify that precision and accuracy in sampling is achieved, RHWM uses QC samples, including trip blanks, field replicates, equipment blanks, and field blanks.

Trip blanks are used to evaluate contamination of volatile organic samples that may result from shipping and handling activities. They are analyte-free media obtained from the laboratory. Unopened trip blank bottles are taken to the sampling site and are returned unopened to the laboratory. One trip blank is obtained each day that a volatile organic waste stream is sampled.

~~Field replicates are two separate samples taken from the same source, stored in separate containers and analyzed independently. Field replicates are used to evaluate sampling~~

Field replicates are two separate samples taken from the same source, stored in separate containers and analyzed independently. Field replicates are used to evaluate sampling analytical precision. One field replicate is obtained per every 20 field samples (5% of the total).

Equipment blanks are used to evaluate sampling equipment decontamination techniques. They consist of analyte-free media that have been used to rinse sampling equipment and are collected after completion of decontamination and prior to sampling. One equipment blank is obtained for one decontamination event or for every 20 samples, whichever is lower.

Field blanks are used to determine cross contamination due to airborne vapors at the sampling site. They are aliquots of analyte-free water or solvent prepared in the laboratory and taken to the field in sealed containers. The blanks are opened near the source of the sampling activity, closed, and then transported back to the laboratory with the other samples obtained that day. A field blank is obtained whenever the sampling strategy, Sampling and Analysis Plan, or Sampling and Analysis Worksheet calls for it, or if the Sampling Team Leader so directs.

The Sampling Team Leader is responsible for receiving and reviewing data from quality control samples.

6.7.2 Training and Personnel Performance

RHWM technicians are trained in the classroom and on the job in the use of sampling devices. Personnel performance evaluations and training are necessary to verify that fingerprint analysis and sampling skills conform to the requirements of the RHWM fingerprint laboratory and EPA-approved sampling methods. For more information this subject, see **Part 7**, Personnel Training, of this Operations Plan.

6.8 Chain of Custody

The COC process is designed to account for samples from the time they are collected through the time that the required analysis is completed and the samples discarded. The sample collector and/or the sample courier is personally responsible for the care and custody of the samples until they are relinquished to another LLNL employee or shipped to a laboratory. A COC form accompanies all samples. The COC form documents such information as the name of the receiving laboratory, requested analyses, sample date and time, relinquishing and accepting persons, and transfer date and time. Samples are tracked by the field identification number or the COC number recorded in logbooks. When sample containers are sent off site, tamperproof seals are applied to the outside shipping container.

Table 8. Description of UNO Storage Compatibility Groups

Group	Description
A	Initiating explosives. Bulk initiating explosives that have the necessary sensitivity to heat, friction, or percussion to make them suitable for use as initiating elements in an explosive train. Examples are wet lead azide, wet mercury fulminate, wet tetracene, dry RDX, and dry PETN.
B	Detonators and similar initiating devices not containing two or more independent safety features. Items containing initiating explosives that are designed to initiate or continue the functioning of an explosive train. Examples are detonators, blasting caps, small arms primers, and fuzes.
C	Bulk propellants, propellant propelling charges, and devices containing propellant with or without their means of ignition. Items that upon initiation will deflagrate, explode, or detonate. Examples are single-, double, triple-base and composite propellants, rocket motors (solid propellant), and ammunition with inert projectiles.
D	Black powder, HE, and ammunition/devices containing HE without its own means of initiation and without propelling charge, or a device containing an initiating explosive and containing two or more independent safety features. Ammunition and explosives that can be expected to explodeor detonate when any given item or component thereof is initiated except for devices containing initiating explosives with independent safety features. Examples are bulk trinitrotoluene (TNT), Composition B, black powder, wet RDX or PETN,bombs, projectiles, cluster bomb units (CBUs), depth charges, and torpedo warheads.
E	Ammunition/explosives devices containing HE without its own means of initiation and with propelling charge (other than one containing a flammable or hypergolic liquid). Ammunition or devices containing HE and containing propelling charges. Examples are artillery ammunition, rockets, or guided missiles.
F	Ammunition containing HE with its own means of initiation and with propelling charge (other than one containing a flammable or hypergolic liquid) or without propelling charge.
G	Fireworks, illuminating, incendiary and smoke, including hexachlorethane (HC) or tear producing munitions other than those munitions that are water activated or which contain WP or flammable liquid or gel. Ammunition that, upon functioning results in an incendiary, illumination, lachrymatory, smoke, or sound effect. examples are flares, signals, incendiary or illuminating ammunition, and other smoke or tear producing devices.
H	Ammunition containing both explosives and WP or other pyrophoric material. Ammunition in this group contains fillers which are spontaneously flammable when exposed to the atmosphere. Examples are WP, plasticized white phosphorus (PWP), or other ammunition containing pyrophoric material.
J	Ammunition containing both explosives and flammable liquids or gels. Ammunition in this group contains flammable liquids or gels other than those which are spontaneously flammable when exposed to water or the atmosphere. Examples are liquid- or gel-filled incendiary ammunition, fuel-air explosive (FAE) devices, flammable liquid-fueled missiles, and torpedoes.
K	Ammunition containing both explosives and toxic chemical agents. Ammunition in this group contains chemicals specifically designed for incapacitating effects more severe than lachrymation. Examples are artillery or mortar ammunition (fuzed or unfuzed) grenades, and rockets or bombs filled with a lethal or incapacitating chemical agent.
L	Ammunition not included in the other compatability groups. Ammunition having characteristics that do not permit storage with other types of ammunition, or kinds of explosives, or dissimilar ammunition of this group. Examples are water-activated devices, prepackaged hypergolic liquid-fueled rocket engines, certain FAE devices, triethyl aluminium (TEA), and damaged or suspect ammunition of any group. Types presenting similar hazards may be stored together but not mixed with other groups.
N	Ammunition containing only extremely insensitive detonating substance (EIDS). Examples are bombs and warheads.
S	Ammunition presenting no significant hazard. Ammunition so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not hinder firefighting significantly. Examples are thermal batteries, explosive switches or valves, and other ammunition items packaged to meet the criteria of this group.

Table 9. Storage Compatibility Mixing Chart[3]

Groups	A	B	C	D	E	F	G	H	J	K	L[4]	N	S
A	X	Z											
B	Z	X	Z	Z	Z	Z	Z						X
C		Z	X	X	X	Z	Z						X
D		Z	X	X	X	Z	Z						X
E		Z	X	X	X	Z	Z						X
F		Z	Z	Z	Z	X	Z						X
G		Z	Z	Z	Z	Z	X						X
H								X					X
J									X				X
K										Z			
L[4]													
N			Z	Z	Z							X	X
S		X	X	X	X	X	X	X	X			X	X

[1] An "X" in the above chart indicates that these groups may be combined in storage. Otherwise, mixing is either prohibited or restricted according to item 2, below.

[2] A "Z" in the above chart indicates that when warranted by operational considerations or magazine nonavailability, and when safety is not sacraficed, limited quantities of these groups may be combined in storage. These relaxations involving mixed storage are approved by the DOE, as authorized by DOD, and are not considered waivers.

[3] No mark in a block indicates that combined storage is not permitted.

[4] Group L is "ammunition not included in other groups, requiring separate storage requirements, and therefore are not compatible with other groups. Group L can be damaged or suspect ammunition of any group and will be stored separately.

Table 108. Parameters of Concern and Analytical Test Methods

Form code	Waste stream name[a]	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
101	Aqueous waste with low solvents	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
						Phases	ASTM D4979 Visual/volume ratio
102	Aqueous waste with low other toxic organics	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
						Oxidizers	Test strip
						Peroxides	Test strip
						Phases	ASTM D4979 Visual/volume ratio
103	Spent acid with metals	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
104	Spent acid without metals	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric

Table 810. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
105	Acidic aqueous waste	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90 (Test strip)
		Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
106	Caustic solution with metals but no cyanide	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90 (Test strip)
						Oxidizers	Test strip
107	Caustic solution with metals and cyanides	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049- 90 (Test strip)
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
						Phases	ASTM D4979 Visual/volume ratio

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
108	Caustic solution with cyanides but no metals	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90(Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
						Phases	ASTM D4979 Visual/volume ratio
109	Spent caustic	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
110	Caustic aqueous waste	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90(Test strip)
		Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
						Peroxides	Test strip
111	Aqueous waste with reactive sulfides	Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strips)
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
112	Aqueous waste with other reactives (e.g., explosives)	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
113	Other aqueous waste with high dissolved solids (C)	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90 (Test strip)
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
114	Other aqueous waste with low dissolved solids (C)	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Cyanides	Identify and special handle reactives; cyanides belong to reactivity groups	9010/9012	Colorimetric	Cyanides	ASTM D5049- 90 (Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
115	Scrubber water	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC/GC/MS	Selected organics	SAW GC

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
116	Leachate	pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC/GC/MS	Selected organics	SAW GC
117	Waste liquid mercury	Mercury	Identify toxic metals	6010 or 7470/7471	ICP or AA	Metals	Hach colorimetric
119	Other inorganic liquids (C)	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC/GC/MS	Selected organics	SAW GC
201	Concentrated solvent-water solution	Selected organics	Identify toxic organics	8000 Series	GC/GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
202	Halogenated (e.g., chlorinated) solvent	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		PCBs	Identify PCB constituent	8082	GC or GC/MS	PCBs	Colorimetric

Table 810. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
203	Nonhalogenated (e.g., non-chlorinated) solvent	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
204	Halogenated/non halgenated solvent mixture	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		PCBs	Identify PCB constituent	8082	GC or GC/MS	PCBs	Colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
205	Oil-water emulsion or mixture	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	1010
		PCBs	Identify PCB constituent	8082	GC or GC/MS	PCBs	Colorimetric
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
206	Waste oil	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		PCBs	Identify PCB constituent	8082	GC or GC/MS	PCBs	Colorimetric
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
207	Concentrated aqueous solution of other organics	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
208	Concentrated phenolics	Phenols	Phenols are toxic organics	8270	GC or GC/MS	Selected organics	SAW GC
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
209	Organic paint, lacquer, or varnish	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC

Table 810. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
210	Adhesives or epoxies	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
211	Paint thinner or petroleum distillates	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
212	Reactive or polymerizable organic liquid	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
						Peroxides	Test strip
219	Other organic liquids (C)	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9040 or 9041	Electrometric or pH paper	pH	SW-846-9040 or 9041
301	Soil contaminated with organics	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
302	Soil contaminated with inorganics only	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS,	Selected organics	SAW GC
304	Other "dry" ash, slag or thermal residue (C)	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
305	"Dry" lime or	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
	metal hydroxide solids chemically "fixed"	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
306	"Dry" lime or metal hydroxide solids not "fixed"	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
307	Metal scale, filings, or scrap	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
308	Empty or crushed metal drums or containers	Last content	Documentation	N/A	N/A	Contents	Visual
309	Batteries, battery parts, casings, cores	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
						Identity	Visual
310	Spent solid filters or adsorbents	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
311	Asbestos solids and debris	Asbestos	Identify and special handle asbestos containing wastes	600/M4-82-020	Polarized light microscopy	Identity	Visual
312	Metal-cyanide salts/chemicals	Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049- 90 (Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
313	Reactive cyanide salts/chemicals	pH	Identify and special handle corrosives	9045	Colorimetric	pH	SW-846-9045
		Cyanides	Identify and special handle reactives	9010/9012	Electrometric	Cyanides	ASTM D5049-90 (Test strip)

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
314	Reactive sulfide salts/chemicals	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strip)
315	Other reactive salts/chemicals (C)	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
316	Other metal salts/chemicals (C)	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
319	Other waste inorganic solids (C)	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
401	Halogenated pesticide solids	Pesticides	Identify organic pesticides	8081	GC/MS	Selected organics	SAW GC
402	Nonhalogenated pesticide solids	Pesticides	Identify organic pesticides	8081	GC/MS	Selected organics	SAW GC
403	Solid resins or polymerized organics	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
404	Spent carbon	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
405	Reactive organic solids	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
406	Empty fiber or plastic containers	Last content	Documentation	N/A	N/A	Contents	Visual

Table 810. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
407	Other halogenated organic solids (C)	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
409	Other nonhalogenated solids (C)	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		PCBs	Identify PCB constituent	8082	GC or GC/MS	PCBs	Colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or CG/MS	Selected organics	SAW GC
501	Lime sludge without metals	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
502	Lime sludge with metals/metal hydroxide sludge	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
503	Waste water treatment sludge with toxic organics	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
504	Other waste water treatment sludge (C)	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90 (Test strip)
505	Untreated plating sludge without cyanides	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90 (Test strip)
506	Untreated plating sludge with cyanides	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90 (Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
507	Other sludge with cyanides (C)	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanides	ASTM D5049-90 (Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
508	Sludge with reactive sulfides	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strip)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
509	Sludge with other reactives	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
510	Degreasing sludge with metal scale or filings	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
511	Air pollution	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
	control device sludge (e.g., fly ash, wet scrubber sludge)	pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
512	Sediment or lagoon dragout contaminated with organics	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
513	Sediment or lagoon dragout contaminated with inorganics only	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
514	Drilling mud	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
515	Asbestos slurry or sludge	Asbestos	Identify and special handle asbestos containing wastes	600/M4-82-020	Polarized light microscopy	Identity	Visual
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
516	Chlorine or other brine sludge	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Chlorine	Identify chloride compounds	9250	Colorimetric	Chlorine	Hach colorimetric
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
519	Other inorganic sludges (C)	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
601	Still bottoms of	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC

Table 810. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
	halogenated (e.g., chlorinated) solvents or other organic liquids						
602	Still bottoms of nonhalogenated solvents or other organic liquids	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
603	Oily sludge	Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
604	Organic paint or ink sludge	Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
605	Reactive or polymerizable organics	Cyanides	Identify and special handle reactives	9010/9012	Colorimetric	Cyanide	ASTM D5049-90 (Test strip)
		Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strip)
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
606	Resins, tars, or tarry sludge	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Flash point	Identify and special handle ignitables	1010	Pensky-Martens Closed-Cup Tester	Flash point	SW-846-1010
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
607	Biological treatment sludge	Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strip)

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test
		Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
608	Sewage or other biological sludge	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		pH	Identify and special handle corrosives	9045	Electrometric	pH	SW-846-9045
		Sulfides	Identify and special handle reactives	9030	Colorimetric	Sulfides	ASTM D4978-95 (Test strips)
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
609	Other organic sludges (C)	Selected organics	Identify toxic organics	8000 Series	GC or GC/MS	Selected organics	SAW GC
		Metals	Identify toxic metals	6010 or 7000 Series	ICP or AA	Metals	Hach colorimetric
701	Inorganic gases	Inorganic gases	N/A	N/A	N/A	N/A	N/A
801	Organic gases	Organic gases	N/A	N/A	N/A	N/A	N/A
001	Lab packs of old chemicals only	Item count	Count accuracy	N/A	N/A	Item count	Visual
002	Lab packs of debris only	Item count	Count accuracy	N/A	N/A	Item count	Visual
003	Mixed lab packs	Item count	Count accuracy	N/A	N/A	Item count	Visual
004	Lab packs containing acute hazardous wastes	Item count	Count accuracy	N/A	N/A	Item count	Visual
009	Other lab packs (C)	Item count	Count accuracy	N/A	N/A	Item count	Visual

Table 8-10. Continued

Form Code	Waste Stream Name	Full-scale Analysis				Fingerprint Analysis	
		Typical parameters of concern or identification	Rationale[b]	Typical EPA analytical method(s)[c]	Test method	Parameter	Analysis test

a Form codes define waste streams classifiable as RCRA hazardous waste, non-RCRA hazardous waste, or RCRA mixed waste.

b Rationale for selecting test parameters are discussed in the Waste Analysis Plan, **Section 5**.

c Analytical laboratory is responsible for using the most currently promulgated analytical method.

(C) = Comments are required in the waste management database system to specify the waste streams for categories with the word "other" in the title.

N/A = Not applicable

PCB = Polychlorinated biphenyl.

RCRA = Resource Conservation and Recovery Act.

Table 119. Fingerprint Analyses and Analytical Test

Analysis Parameters	Test Methods	Analysis Parameters	SW-846 Test Methods
Physical Tests		Flash point / ignitability	1010
Color	ASTM D4979 (visual)	Volatile organics	8260, 8021
Physical state/free liquids/ sludge content	ASTM D4979 (visual)	Semivolatile organics (incl. phenol)	8270
Layering	ASTM D4979 (visual)	PCBs, pesticides	8080
Odor	ASTM D4979	pH	9040, 9041, 9045
Turbidity	ASTM D4979 (visual)	Metals (incl. mercury)	6010, 7470, 7471
Viscosity	ASTM D4979 (visual)	Cyanides	9010, 9012
Rad screening	Geiger counter/LSC	Sulfides	9030
Chemical Tests		EP TOX/TCLP	1310, 1311
Solubility	Visual/gravimetric	Paint filter	9095A
Water compatibility / reactivity	ASTM D5058-90; thermocouple	Asbestos	600 / M4-82-020
Specific gravity	ASTM D1429-76	Chlorine	9250
Cyanide	ASTM D5049-90 (test strips)		
Sulfide	ASTM D4978-95 (test strips)		
Oxidizer screen	Test strips		
Total solids	STD Methods–209A		
Solvent screen / selected organics	SAW/GC		
Acidity	STD Methods–402		
Alkalinity	STD Methods–403		
Metals	Spectrophotometer instrumental methods and Hach Colorimetric Methods (various)		
Peroxides	Test strips		
Anions	Hach Methods (various)		
Oil and grease	Hach Methods (various)		
PCBs	Instrumental conductivity and Colorimetric methods		
Chlorine	Hach Colorimetric Method		
Normality	Titration		

LSC = Liquid Scintillation Counter
ASTM = American Society for Testing Materials
DCP = Drum Consolidation Protocol
STD Methods = Standard Methods
SAW/GC = Surface Acoustic Wave/Gas Chromatograph

Table 120. Sample Containers, Preservatives, and Holding Times Including Inorganic, Organic, and Physical Tests

Type of analysis	EPA analytical method[a]	Minimum no. of samples and size[b]	Sample container type[b]	Typical preservation[b] solid and liquid Waste	Typical preservation[b] wastewater	Maximum holding time
Inorganic tests						
Cyanide—total and amenable to chlorination	Method 9010, 9011, or 9012	1 × 100 mL (liquid) 1 × 100 gm (solid)	P, G (liquid, solid)	Cool to 4°C	For total cyanide: cool to 4°C , add NaOH to pH>12, and store in the dark. For cyanide amenable to chlorination: cool to 4°C , add NaOH to pH>12, add 0.6 gm ascorbic acid, and store in the dark (liquid, solid).	14 days
Metals (total)	Method 6010 or 7000 series	1 × 250 mL (liquid) 1 × 50 gm (solid)	P, G (liquid, solid)	Cool to 4°C	For total metals: add HNO_3 to pH<2. For dissolved metals: filter on-site, add HNO_3 to pH<2. Cool to 4°C (liquid). Cool to 4°C (solid).	6 months
TCLP[c]	Method 1311[d]	1 × 250 gm (solid)	P, G (solid)	Cool to 4°C	Cool to 4°C (solid).	7 days[e]
WET[f]	WET	1 × 250 gm (solid)	P, G (solid)	Cool to 4°C	Cool to 4°C (solid).	7 days[e]
Organic tests						
Phenols	Method 8270	1 × 500 mL (liquid) 2 × 40 mL VOA (solid)	AG-TLC (liquid) G-TLC (solid)	Cool to 4°C	Add 0.008% $Na_2S_2O_3$. Cool to 4°C (liquid). Cool to 4°C (solid).	7 days[e]
Oil and grease	Method 9070	1 × 500 mL (liquid)	G (liquid)	Cool to 4°C	Add H_2SO_4 to pH<2. Cool to 4°C (liquid).	28 days

Table 120. Continued

Type of analysis	EPA analytical method[a]	Minimum no. of samples and size[b]	Sample container type[b]	Typical preservation[b] solid and liquid Waste	Typical preservation[b] wastewater	Maximum holding time
Organic tests (continued)						
Volatile organics	Method 8240 Method 8260 Method 8010 Method 8020 Method 8021	2 × 40 mL zero headspace (liquid) 1 × 4 oz squat jar, zero headspace, Teflon tape (solid)	G-TLS (liquid) G-TLC (solid)	Cool to 4°C	Cool to 4°C immediately; add 100 mg $Na_2S_2O_3$/L if residual chloride is present (liquid). Cool to 4°C (solid).	14 days
Semivolatile organics	Method 8270	1 × 1 L (liquid) 2 × 40 mL VOA (solid)	AG-TLC (liquid) G-TLC (solid)	Cool to 4°C	Cool to 4°C immediately; add 100 mg $Na_2S_2O_3$/L if residual chloride is present; adjust to pH<2 with H_2SO_4, HCL, or $NaHSO_4$ (liquid). Cool to 4°C (solid).	7 days[c]
Pesticides/ PCBs	Method 8080	1 × 1 L (liquid) 1 × 4 oz squat jar, zero headspace, Teflon tape (solid)	AG-TLC (liquid) G-TLC (solid)	Cool to 4°C	Cool to 4°C (liquid, solid).	7 days[c]
Total petroleum hydrocarbons	Method 8010/8015	2 × 40 mL, zero headspace (liquid) 1 × 4 oz squat jar, zero headspace, Teflon tape (solid)	G-TLC (liquid, solid)	Cool to 4°C	Cool to 4°C (liquid, solid).	7 days[c]

Table 120. Continued

Type of analysis	EPA analytical method[a]	Minimum no. of samples and size[b]	Sample container type[b]	Typical preservation[b] solid and liquid Waste	Typical preservation[b] wastewater	Maximum holding time
Physical tests						
pH	Method 9040 or 9041 (liquid), 9045 (solid)	1 × 50 mL (liquid) 1 × 10 gm (solid)	P, G (liquid) G (solid)	Cool to 4°C	Cool to 4°C (liquid, solid).	24 hours
Settleable matter	Method 160.5[g]	1 × 1 L (liquid)	P, G (liquid)	Cool to 4°C	Cool to 4°C (liquid).	48 hours
Specific gravity	Method 2710F[h]	1 × 25 mL (liquid)	P, G (liquid)	Cool to 4°C	Cool to 4°C (liquid).	None specified
Flash point	Method 1010	1 × 100 mL (liquid)	G-TLC (liquid)	Cool to 4°C	Cool to 4°C (liquid).	28 days
Paint filter test	Method 9095	1 × 100 mL (liquid) 1 × 100 gm (solid)	G (liquid, solid)	Cool to 4°C	None required.	N/A
Asbestos	Method 600	1 × 300 gm (solid)	G (solid)	Cool to 4°C	Cool to 4°C (solid).	N/A
Gross alpha, gross beta	Method 9310	1 × 250 mL (liquid) 1 × 10 gm (solid)	P (liquid, solid)	Cool to 4°C	pH < 2 with nitric acid (liquid).	6 months
Tritium	Method 906.0[i]	1 × 250 mL (liquid) 1 × 10 gm (solid)	P (liquid, solid)	Cool to 4°C	pH < 2 with nitric acid (liquid).	6 months
Gamma	Method 901.1[i]	1 × 250 mL (liquid) 1 × 10 gm (solid)	P (liquid, solid)	Cool to 4°C	pH < 2 with nitric acid (liquid).	6 months

Table 102. Continued

[a] EPA, 1986.

[b] Sample container type, volume, and preservative will be verified with the analytical laboratory before sampling.

[c] Waste streams subject to Land Disposal Restrictions.

[d] Extraction procedure. The extracted waste is then analyzed using EPA Methods 6010 or 7000, and 8000 Series.

[e] Days to extraction; 40 days to analysis after extraction.

[f] Waste streams whose concentrations fall between the soluble threshold limit concentration (STLC) and total threshold limit concentration (TTLC).

[g] EPA, 1983.

[h] American Public Health Association et al., 1989, p. 2–86.

[j] EPA, 1980.

AG-TLC = Amber glass with Teflon-lined cap.
G = Glass.
G-TLC = Glass with Teflon-lined cap.
G-TLS = Glass with Teflon-lined septum.
N/A = Not applicable. Method does not specify preservative or holding time.
P = Polyethylene.
PCB = Polychlorinated biphenyl.
TCLP = Toxicity characteristic leaching procedure.
VOA = Volatile organic analysis.
WET = Waste extraction test.

Table 1~~1~~3. Waste Types and Sampling Devices

Sample matrix and container type	Typical sampling devices
Liquids in containers greater than or equal to 55 gallons (i.e., carboys and drums)	COLIWASA (plastic or glass), thief, pipette
Liquids in Containers greater than 55 gallons	Sampling port, bailer
Solids and sludges in drums, boxes, and piles	Corer, trier, scoop

COLIWASA = Composite Liquid Waste Sampler. (Aqueous liquid use plastic. Organic liquid use glass.)

Table 124. Container Types and Specifications

Container Type	UN Specifications	Lining	Waste Type
12-gal, open-top, high-density, high-molecular-weight polyethylene (HDPE)	UN1H2	Appropriate liner, if required	Solid and liquid waste, aerosols, miscellaneous small items to be overpacked in container
5-gal pail, open top with a screw lid (90 ml), HDPE	UN1H2	Appropriate liner, if required	Solid and liquid waste, aerosols, miscellaneous small items to be overpacked in container
55-gal, open-top, HDPE	UN1H2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
30-gal, closed-top, HDPE	UN1H1	None	Waste acids, photochemicals and aqueous solutions
30-gal, open-top, HDPE, bolt ring or side lever ring	UN1H2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
5-gal can with crimp lid, metal, 24-gauge	UN1H2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
5-gal can with closed-head, screw cap, metal, 24-gauge	UN1A1	None	Aqueous/organic solutions, halogenated and flammable solvents, waste oils, photochemicals and waste paints
5-gal, tight-head jerrican, HDPE.	UN3H1	None	Waste acids, photochemicals and aqueous solutions
55-gal, steel, open-head drum with one 3/4-in. bung in lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container

Table 124. Continued

Container Type	UN Specifications	Lining	Waste Type
55-gal, steel, closed-head drum with bungs	UN1A1	None	Aqueous/organic solutions, halogenated and flammable solvents, waste oils, photochemicals and waste paints
10-gal, steel, open-head drum with lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
55-gal composite drum with 40-mil liner. Top has two 2-in. fittings	UN6HA1	Polyethylene bag	Waste acids, photochemicals and aqueous solutions
30-gal, steel, open-head drum with one 3/4-in. bung in lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
5-gal tight-head round drum, HDPE	UN1H1	None	Waste acids, photochemicals and aqueous solutions
55-gal, closed-top, HDPE	UN1H1	None	Waste acids, photochemicals and aqueous solutions
55-gal, steel, open-head drum with lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
55-gal, steel, open-head drum with one 3/4-in. Bung in lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
20-gal, steel, open-head drum with one 3/4-in. bung in lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container

Table 124. Continued

Container Type	UN Specifications	Lining	Waste Type
30-gal, steel, open-head drum with lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container
85-gal, steel, open-head salvage drum with lid and ring assembly	UN1A2	Appropriate liner, if required	Solid and liquid waste, debris, miscellaneous equipment aerosols, miscellaneous small items to be overpacked in container. Also, overpack for leaky, bulging, or damaged 55-gal drums
4-ft x 4-ft x 7-ft metal box (nominal dimensions and weight)	None (Strong Tight)	None	Solid wastes, debris, miscellaneous equipment and soils
4-ft x 2-ft x 7-ft metal box (nominal dimensions and weight)	None (Strong Tight)	None	Solid wastes, debris, miscellaneous equipment and soils
4-ft x 4-ft x 7-ft wooden box (nominal dimensions and weight)	None (Strong Tight)	None	Solid wastes, debris, miscellaneous equipment and soils
4-ft x 2-ft x 7-ft wooden box (nominal dimensions and weight)	None (Strong Tight)	None	Solid wastes, debris, miscellaneous equipment and soils
4-ft x 2-ft x 7-ft metal box. Department of Transportation (DOT) Industrial Packaging 1 (49 CFR 173.411 b-1). Boxes are to be manufactured per Specification IP1-N427	IP1	Polyethylene bag	Solid wastes, debris, miscellaneous equipment and soils
4-ft x 4-ft x 7-ft metal box. DOT Industrial Packaging 1 (49 CFR 173.411 b-1). Boxes are to be manufactured per Specification IP1-N447	IP1	Polyethylene bag	Solid wastes, debris, miscellaneous equipment and soils

Table 124. Continued

Container Type	UN Specifications	Lining	Waste Type
4-ft x 2-ft x 7-ft, metal box. DOT Industrial Packaging 2 (49 CFR 173.411 b-2). Boxes are to be manufactured per Specification IP2-N427	IP2	Polyethylene bag	Solid wastes, debris, miscellaneous equipment and soils
4-ft x 4-ft x 7-ft metal box. DOT Industrial Packaging 2 (49 CFR 173.411 b-2). Boxes are to be manufactured per Specification IP2-N447	IP2	Polyethylene bag	Solid wastes, debris, miscellaneous equipment and soils
Metal drum, DOT7A Type A Drum (49 CFR 173.350). Myers Model G5501, UN1A2, 208-L, galvanized drum with high-density polyethylene liner designed and tested per DOE/RL-96-57 Volume 2, Chapter 2-1	7A Type A	Polyethylene liner	Solid wastes, debris and miscellaneous equipment
40-in. x 40-in. x 40-in. fiberboard box	UN11G	Polypropylene fabric bag	Solid wastes, debris, miscellaneous equipment and soils
110-gal steel overpack drum	UN 1A2	Appropriate liner, if required	Overpack for leaky, bulging, or damaged 55-gal drums
330-gal polyethylene portable tank	UN 31H, Non-DOT spec	None	Aqueous solutions of: waste acids, photochemicals, caustic waste, organic/inorganic solutions
600-gal polyethylene portable tank	UN 31H, Non-DOT spec	None	Aqueous solutions of: waste acids, photochemicals, caustic waste, organic/inorganic solutions, oil, halogenated solvents, flammable solvents
625-gal stainless steel portable tank	UN 31A, Non-DOT spec	None	Aqueous solutions of: waste acids (no HCl), photochemicals, caustic waste, organic/inorganic solutions, oil, halogenated solvents, flammable solvents

Table 124. Continued

Container Type	UN Specifications	Lining	Waste Type
Seamless steel cylinder	DOT specification 3A and 3AX	None	Compressed gas
Seamless steel cylinder	DOT specification 3AA and 3AAX	None	Compressed gas
Seamless steel cylinder	DOT specification 3B	None	Compressed gas
Seamless nickel cylinder	DOT specification 3BN	None	Compressed gas
Steel cylinder with porous fillings	DOT specification 8	None	Compressed gas; acetylene
Steel cylinder with porous fillings	DOT specification 8AL	None	Compressed gas; acetylene
Non-reusable (non-refillable) cylinder	DOT specification 39	None	Compressed gas
Lecture bottles and other small non-spec cylinders and spheres	None	None	Compressed gas
Plastic Tote Boxes	None	None	Explosives Charges, Pieces and Parts
Poly Bags	None	None	Debris Contaminated with Explosive Materials with Potential for Detonation

Part IV

Facility Design and Operations

PART IV FACILITY DESIGN AND OPERATIONS

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Information on the construction of Magazines #3, and #4, including their foundations and floor slabs, above-grade structures, run-on and run-off controls, and utilities, is given below. See **Figures IV-4** and **IV-5** for engineering drawings for this unit.

1.2.1.1 Foundation and Floor Slab

The floors of Magazines # 3 and #4 are 1-~~ft~~0-in.-thick, reinforced concrete covered with a non-conducting, non-sparking membrane. The flat floor slabs for Magazines #3 and #4 measure 12 ft 4 in. by 11 ft 2 in.

The asphalted areas exterior to the structures are sloped upward to meet flush at the entrance.

1.2.1.2 Above-grade Structures

Magazines #3 and #4 are steel-reinforced concrete bunkers that measure 9 ft 9 in. high from the inside and are overlain with earth berms. The reinforced concrete front walls and roof are 1 ft thick, and the reinforced concrete side walls are 10 in. thick and are covered with 3 ft of earth. The storage areas have vault doors constructed of two 1/4-in. steel plates with 4 in. of fiberglass insulation between them. Two screened metal louvers in front and a 12-in. pipe at the rear provide ventilation for the magazines.

The magazines have two supported, steel frame plywood shelves along the inside walls. See **Figure IV-6** for floor plan detail.

1.2.1.3 Run-on and Run-off Controls

The concrete walls and roofs of Magazine #3 and #4 completely protect them from blown-on precipitation. Both Magazine #3 and #4 have a canopy over the doorway and a concrete ramp that slopes down from the doorway to facilitate drainage away from the entry. The units have no floor drains.

Explosive wastes-containing water may be stored in these magazines in small quantities. Individual liquid waste containers are provided with secondary containments that are compatible and can contain 100% of the waste stored.

Containers within the unit are stored on the shelves or elevated on pallets or skids to prevent any contact with potential accumulated liquids within the storage area.

1.2.2 Magazines #2 and #5

Magazines #2 and #5 are semi-cylindrical, corrugated metal structures that are used to store, manage, inspect, and maintain containers.

Information on the construction of Magazines #2 and #5, including their foundations and floor slabs, above-grade structures, run-on and run-off controls, and utilities, is given below. See **Figures IV-7** and **IV-8** for engineering drawings for this unit.

1.2.2.1 Foundation and Floor Slab

The floors of Magazine #2 and #5 are 1-ft-10-in.-thick, reinforced concrete and are covered with a non-conducting, non-sparking membrane. The floor slabs for Magazines #2 and #5 are flat and measure 21 ft 10 in. by 15 ft 5 in., and 15 ft by 10 ft, respectively.

The asphalted areas exterior to the magazines are sloped upward to meet flush at the entrance.

1.2.2.2 Above-grade Structures

Magazines #2 and #5 are semi-cylindrical, corrugated metal structures that measure 9 ft 2 in. and 7 ft 8 in. high, respectively, and are overlain with earth berms. The storage areas have vault doors constructed of two 1/4-in. steel plates with 4 in. of fiberglass insulation between them.

The magazines have two supported steel frame plywood shelves along the inside walls. Magazine #2 also has a row of freestanding plywood shelves in the center of the room. See **Figure IV-6** for floor plan detail. A screened metal louver in the front door provides additional ventilation for Magazine 5. Magazine 2 does not have additional ventilation besides the natural ventilation.

1.2.2.3 Run-on and Run-off Controls

Concrete walls and roofs completely protect Magazine #2 and #5 from blown-on precipitation. The corrugated metal structure of Magazine #2 extends over the doorway to provide a canopy to keep precipitation away from the entry. The exterior paving at Magazines #2 and #5 slopes away from the doorways to facilitate drainage from the entry. The Units have no floor drains.

Explosive wastes that contain water may be stored in these magazines in small quantities. Individual waste containers are provided with secondary containments that are compatible and can contain 100% of the wastes stored.

Containers within the unit are stored on the shelves or elevated on pallets or skids to prevent any contact with potential surface liquids within the storage area.

1.2.3 Magazine 816 High-Explosive-Contaminated Waste Storage Unit

Magazine 816 (M 816) is an enclosed, prefabricated metal building installed on a concrete slab. Information on the construction of the M 816, including its foundations and floor slabs, above-grade structures, run-on and run-off controls, and utilities, is given below. See **Figure IV-9** ~~for an engineering drawing of this unit~~and **Figure IV-16** for drawings of this unit.

1.2.3.1 Foundation and Floor Slab

The M 816 Storage Unit is an enclosed prefabricated building measuring 27 ft by 38 ft. The building is installed on a concrete slab.

The foundation consists of spread-type footings. The floor slab is a flat, seamless, 6-in.-thick concrete slab reinforced with #4 steel bars on 12-in. centers.

1.2.3.2 Above-grade Structures

The M 816 Storage Unit is a welded steel-frame structure with corrugated metal sides and roof. The minimum height of the building is 7 ft in the aisles and 12 ft over drum storage areas. The roof slopes to gutters on the east and west sides of the structure.

1.2.3.3 Run-on and Run-off Controls

The metal walls and roof completely protect M 816 Storage Unit from blown-on precipitation. The exterior areas are sloped away from the magazine to minimize run-on to the unit. Gutter and downspout systems divert storm water to local drainage swales.

Containers within the storage unit are elevated on pallets or skids to prevent contact with potential surface liquids within the storage area. Only solid wastes are stored in this unit. The unit has no floor drain.

1.3 Explosive Waste Treatment Residue Storage Units

Two relatively small storage units are located near the Explosive Waste Treatment Facility (EWTF) control room and Open Burn treatment units. The two small storage units are used to store treatment residues from the Open Burn (OB) and Open Detonation (OD) operations.

Information on the construction of the units, including their foundations and floor slabs, above-grade structures, run-on and run-off controls, and utilities, is given below.

1.3.1 Above-grade Structures

The storage unit near the OD unit is made of plastic and is capable of storing two 55-gal drums of waste. The cabinet consists of two pieces: the bottom piece of the cabinets forms the secondary containment for the two drums of solid ash residues that will be stored in them. The top piece covers the drums and completely encloses the unit. See **Figure IV-10** for a photograph of the unit.

The treatment residue storage unit near the OB units is a metal chemical storage cabinet and is capable of storing five 55-gal drums. The cabinet is provided with its own secondary containment. **See Figure IV-11** for a photograph of the unit.

1.3.2 Run-on and Run-off Controls

No liquids are stored in the units. The units are completely enclosed and elevated. Therefore, no run-on or run-off controls are needed.

1.4 Container Descriptions

As defined in 22 CCR 66260.10, containers are any portable devices that are used to store, handle, treat, transport, recycle, or dispose of a hazardous waste. The definition specifically includes portable tanks that have a capacity greater than 110 gal. In general, the containers used at LLNL Site 300 range in size from 1 mL to 1000 gal and include cans, bags, vials, jars, bottles, drums, boxes, carboys, portable tanks, and tank trailers.

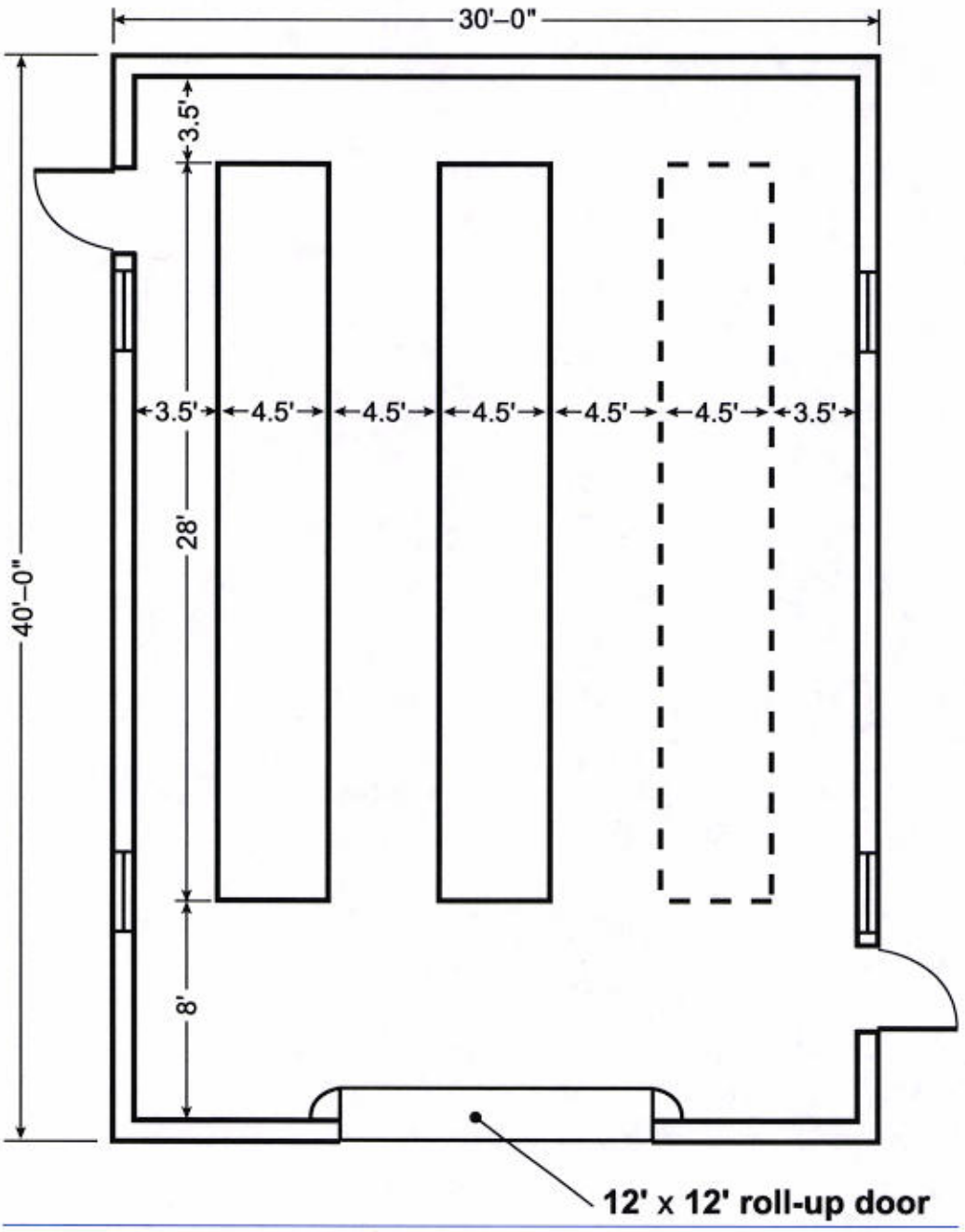

Figure IV-16. Magazine 816 Typical Container Storage Configuration

Part VI

Management Practices

PART VI MANAGEMENT PRACTICES

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Once the waste container is moved from a generator area into a permitted hazardous waste management facility for storage, the chemical compatibility code is maintained on the waste container at all times. If at any time the WDR is to be removed from the container, such as to update the WDR or to add additional information to the WDR, then the chemical compatibility code identified on the WDR is transferred onto a container label or directly onto the waste container.

The method used to segregate or isolate incompatible waste is consummate with the magnitude of the hazard posed by the waste. For example, non-explosives incompatible solid wastes are elevated on pallets and separated with a 2.5-ft buffer zone (minimum) to prevent contact with any accumulated liquid. Pallets that are equipped with secondary containment are used to contain leaks and spills from containers holding liquid waste that pose a low incompatibility concern. These containment pallets are made of fiberglass, plastic, or metal and have various capacities that adequately contain the contents of the largest container (typically 55 gal) that would be placed on them. For containers equal to or larger than 55 gal, incompatible liquid wastes are either in separate containment areas or are stored at approximately the same grade level in secondary containment at a separation of more than 8 ft. When secondary containment pallets are used to separate incompatibles, container stacking is not allowed. Manufacturers' literature on these containment pallets is presented in **Appendix VI-B**. The information provided in **Appendix VI-B** is not intended to be inclusive of all secondary containment devices that may be used but rather is intended to be representative of the type of commercially available products. For explosive wastes, incompatibles are stored in different magazines.

Wastes are not placed into unrinsed containers, portable tanks, or treatment equipment unless the material is compatible with the waste that was previously stored or treated in the container, tank, or equipment. Portable tanks and tank trailers are rinsed between uses when required to remove or deactivate incompatible substances. Visual observation is used to verify that waste residues have been adequately removed. Other decontamination methods are not normally required. Rinse waters and other residues are characterized and managed as described in the WAP, **Part III** of this Part B permit application. The rinsate is typically managed in the same manner as the previous contents of the container or tank. When the rinsing process is completed, the container or tank may be reused.

The type and the amount of incompatible wastes expected to be managed at the Site 300 Hazardous Waste Management Facilities are not expected to result in significant toxic fume or explosion hazard in the event that they are commingled during accidental spillage or fires. See Part III, Waste Characteristics, for further explanation of identifying and segregating incompatible wastes.

2.4.7 Management of Ignitable and Reactive Wastes

All of the Site 300 storage areas are used to store ignitable and reactive wastes. All Hazardous Waste Management Facilities are located at greater distances to LLNL Site 300 boundary than the minimum regulatory requirement of 50 ft. PCB wastes are managed at B883 Container Storage Unit.

Smoking is not permitted within hazardous waste storage and processing areas. "No Smoking" signs are posted at areas where flammable or ignitable waste is stored or processed. Ignition

Part IX

Closure Plan

PART IX CLOSURE PLAN

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Table IX-2. Potential Historical Contaminants at the Explosive Waste Storage Facility (EWSF)

Contaminants		
Azides	Inorganic perchlorates	Nitro-aromatics
Epoxies (cured)	Nitramines	Nitro-hetrocyclics
Ethanol	Nitrate esters	Non-halogenated volatile organics
Halopolymers (cured)	Nitro-aliphatics	Urethanes (cured)
Inorganic nitrates	Nitro-amino-aromatics	Volatile halogenated organics

Table IX-3. Potential Historical Contaminants at the Explosive Waste Treatment Facility (EWTF)

Potential Contaminants		
Explosive Constituents	**Hazardous Metals**	**Other Constituents**
Azides	Antimony	2, 3,7-8 TCDD and isomers[a]
Inorganic nitrates	Arsenic	Non-halogenated organics
Inorganic perchiorates	Barium	Total Petroleum Hydrocarbons
Nitramines	Beryllium	Volatile halogenated organics
Nitrate esters	Cadmium	
Nitro-aliphatics	Chromium (total)	
Nitro-amino-aromatics	Chromium (VI)	
Nitro-aromatics	Cobalt	
Nitro-hetrocyclics	Copper	
	Lead	
	Manganese	
	Mercury	
	Nickel	
	Selenium	
	Silver	
	Thallium	
	Vanadium	
	Zinc	

[a] 2,3,7-8 TCDD and isomers analysis pending periodic ash analysis results and background soil sampling results.

1.4 Closure Performance Standards

LLNL closure activities will meet closure performance standards to clean-close the hazardous waste management units. After completion of closure activities, no hazardous waste or hazardous chemical residues will remain in the closed units. Risk-based clean closure may also be demonstrated by performing a risk assessment. Determination of closure performance standards shall be developed and approved by DTSC based on DTSC approved risk assessment methodology immediately prior to initiating closure. Clean closure will preclude the need for post-closure care to control/prevent releases of hazardous chemical constituents to the environment.

APPENDIX IX.A-1
SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR BUILDING 883 CONTAINER STORAGE AREA CLOSURE

Appendix A-1. Sampling and Analysis Plan and Closure Process Description for Building 883 Container Storage Closure

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APPENDIX A-1. SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR BUILDING 883 CONTAINER STORAGE CLOSURE

1 Introduction

The Site 300 Building 883 Container Storage Area (B883 CSA) receives hazardous and mixed wastes in containers for storage pending shipment off site to a permitted recovery, treatment, or disposal facility.

This Sampling and Analysis Plan (SAP) and closure process description have been prepared to support closure activities for the B883 CSA.

2 Closure Process

In general, the closure of the B883 CSA will consist of the decontamination of structure surfaces. The presence of contaminated soils is considered unlikely because of the design and the operation of the facility as described in this permit application. Core samples from beneath the asphalt or concrete surfaces near the entrances of the B883 CSA will be collected to verify the absence of contaminated soils. Concrete core sample analysis testing methodology, scope of analysis, and laboratory detection limits shall be pre-appproved by DTSC before initiation of closure activities. The radioactive materials aspect of the closure will be conducted in accordance with the Department of Energy's rules and directives.

The non-porous structure surfaces to be decontaminated will be swipe-sampled to confirm successful decontamination. Detailed wipe sampling procedures, including the type of filter paper and solvent to be used, analysis testing methodology, and laboratory detection limits shall be pre-approved by DTSC before proceeding with closure. All ~~surfaces~~areas of contamination that are determined to be contaminated based on the results of the verification sampling and analysis program will be decontaminated or excised.

The specific closure activities will be as follows:

1. Using knowledge of the waste constituents managed at the unit (**Table A.1-1**), select several parameters indicative of the wastes managed historically (that is, metals, solvents, oils, inorganics) for inclusion in the verification sampling program. See **Table A.1-2** for the list of parameters.
2. Collect a minimum of three grab samples of water from the water bib or hydrant that will supply the water for decontamination efforts.
3. Collect five core samples of soil from the hill north of the B883 CSA to determine background levels of selected parameters (**Table A.1-2**) in materials that are not associated with hazardous waste management activities. Analytical results will be compared with applicable area-specific soil characterization data from the Federal Facilities Agreement (FFA)/Comprehensive Environmental Response, Compensation,

and Liability Act (CERCLA) sampling history and/or available U.S. Geological Survey soil data.

4. Analyze the grab samples of water for the parameters selected in Step 1. Calculate the mean and standard deviation for each parameter.

5. Decontaminate the surfaces in the B883 CSA and the chemical storage locker by using a hydroblaster or a steam cleaner. Hydroblasting may be accomplished using appropriate cleaning agents (such as detergents, chelating agents) or water alone. Steam cleaning may be accomplished using similar substances. **Table A.1-3** summarizes the decontamination methods and the cleaning agents that may be used for each of the various groups of contaminants that may be encountered. The decontamination method selected from **Table A.1-3** will be based on the type of contaminants anticipated.

6. Collect the wastewater (decontamination and rinse solutions) generated by decontamination efforts in the floor sump in the south corner of the facility. Wastewater from decontamination efforts in the chemical storage locker will be collected within the locker's containment. An auxiliary pumping system will be used to pump the wastewater from the sumps into a portable tank or other suitable container. Residual liquids will be removed with absorbent material that will be collected and placed into appropriate containers. The absorbent material will be handled as appropriate based on the analytical results of the sampled wastewater.

7. Grid the decontaminated floor into a minimum of 10 equal-size areas. Grid the chemical storage locker sump into a minimum of four areas. Grid the sump into a minimum of two areas. Collect at least one swipe sample of 100 cm^2 in the center of each of the grid areas. In addition, collect at least one swipe sample from areas where spills are known to have occurred, low spots, and other areas where waste or contaminated liquid may have accumulated during the operating life of the unit. Document the sample locations on a map or a schematic drawing of the unit. Areas where visible damage, cracks, or staining in the floor sealant are evident will be sampled by coring or chipping at that location.

8. Analyze the swipe samples (or core samples, if available) for the parameters identified in Step 1. **Table A.1-2** lists the parameters and the sampling and analytical methods.

9. Consider the parameters present in the swipe and/or core samples at levels statistically greater than both detection limits and established background levels to be indicative of residual surface contamination and of the need to repeat Steps 5 through 8 at the affected, documented sample location. Consider the parameters present on the samples at levels less than non-detect or established background levels to verify effective decontamination and clean closure for those parameters. Thus, additional analysis and subsequent decontamination are not required. Swipe analysis results will also be compared to the water supply samples to determine whether any residual contamination detected is from waste management activities or is an artifact of the water supply used for decontamination.

10. After verifying the clean closure of interior surfaces (Step 9), sample and analyze all collected decontamination and rinse solutions for proper disposal. Collect at least one sample for every 500 gal and composite the discrete samples.

11. Compare the analytical results from Step 10 for proper handling. **Table A.1-4** provides an estimate of quantities of waste to be generated during decontamination activities.
12. One core sample will be collected from the soil under the outlet from the concrete sump in the south corner of the B883 CSA. Two samples will be obtained from random points selected in the area near the main access gate on the northeast side of the facility. Soil samples will be collected using an appropriate drilling method at the following intervals: 0 to 4 in., and at 1, 2, 5, and 10 ft below the soil surface.
13. Analyze the core samples for parameters identified in Step 1. **Table A.1-2** lists the parameters and the sampling and analytical methods.
14. Compare the soil sample analytical results to the "clean" core samples collected in Step 3 to determine whether any residual contamination detected is from hazardous waste management activities.

The specific sampling and analysis methodology and quality assurance (QA) and quality control (QC) measures are described in **Section 3** of this Appendix.

All personnel who participate in closure activities at the B883 CSA will have appropriate training to perform the assigned tasks. Any contractors or their subcontractors, as part of the contract requirements, must also provide evidence of training employees to perform hazardous waste management activities.

3 Sampling Procedures

All sampling will be performed by personnel trained in U.S. Environmental Protection Agency (EPA) environmental sampling techniques and applicable LLNL Procedures for sampling. The sampling team will consist of personnel from the LLNL Environmental Protection Department or contractors who are experienced in these sampling methods. Sampling personnel will follow the health and safety procedures and wear the appropriate protective clothing specified in the *Site Safety and Health Plan* (see **Appendix IX.B**).

3.1 Sample Collection Procedures

The following samples may be taken prior to or during closure:

- Swipe samples of the epoxy-sealed containment foundation, external to hazardous waste storage operations, to establish background characteristics
- Swipe samples of the sump and grating area of the chemical storage locker
- Swipe samples of the secondary containment structures to confirm clean closure
- Concrete core samples of the floor in areas of known spills, visible damage, and/or cracks
- Samples of the soil from areas surrounding or underlying the unit
- Samples of the water supply to be used in decontamination to establish background values for contaminants
- Samples of the decontamination waste to identify waste constituent concentrations and to determine disposition of the waste.

The secondary containment system and chemical storage locker will be decontaminated and sampled. However, if the swipe sampling of concrete from the secondary containment system still indicates contamination after repeated decontamination and sampling and analysis, the concrete will be removed as part of the closure plan. If the soil sampling demonstrates contamination, the cognizant agency will be informed, and an investigation will be performed.

The following sections describe the procedures to be used in collecting samples:

3.1.1 Swipe Sampling Procedures

After decontamination is performed, all surfaces will be swipe-sampled to determine whether any residual contamination is present. If contamination is detected, the affected area will be decontaminated again and swipe-sampled again to confirm clean closure. Swipe samples will be taken as follows:

1. The secondary containment system will be divided into a minimum of ten equal-size areas. The B883 CSA sump will be divided into a minimum of two areas. The chemical storage locker will be divided into a minimum of four areas. At least one swipe sample of 100 cm^2 will be taken in the center of each grid area. Swipe samples will also be taken at each location where a spill is known to have occurred (based on operational history) and in low-lying areas within the structure where liquids may have accumulated.
2. Samples shall also be taken where there is evidence of crystallization, staining, or discoloration.
3. A 1-in^2 Wattman size 50 gauze pad or equivalent will be saturated with the appropriate solvent. The moistened pad will be used to thoroughly swab a 100-cm^2 area to be sampled. Even pressure will be applied, and the area will be wiped in a systematic way, that is, from top to bottom in a left-to-right motion.
4. The swipe sample will be placed in a clean glass jar, appropriate preservatives will be added, and the jar lid will be secured.
5. A label denoting a unique sample number, the analyses to be conducted, and the specific location of the sample will be affixed to the glass jar, and a custody seal applied. A chain-of-custody record will be initiated.
6. Steps 3 through 5 will be repeated for each sampling location to obtain the necessary number of samples for all analytical parameters of interest.
7. A field blank will be prepared by saturating a Wattman size 50 gauze pad or equivalent with the appropriate solvent.
8. The samples will be stored on ice or "blue ice" in a cooler for transport to an off-site California-certified analytical laboratory for analysis.
9. All sampling locations will be recorded on a schematic and documented in the field log kept for closure activities.
10. Samples will be analyzed for metals and organics using the methods listed in **Table A.1-1**. Metals will be analyzed by the Total Threshold Limit Concentration (TTLC) procedure.

APPENDIX A-2
SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR THE EXPLOSIVE WASTE STORAGE FACILITY (EWSF) CLOSURE

APPENDIX A-2. SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR THE EXPLOSIVE WASTE STORAGE FACILITY (EWSF) CLOSURE

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APPENDIX A-2. SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR THE EXPLOSIVE WASTE STORAGE FACILITY (EWSF) CLOSURE

1 Introduction

The Site 300 Explosive Waste Storage Facility (EWSF) receives explosive hazardous wastes in containers for temporary storage pending on-site treatment at the Explosive Waste Treatment Facility (EWTF), or shipment off site to a permitted treatment or disposal facility. The hazardous wastes include explosive charges; explosive pieces, powders, and parts; explosive filtration system waste; and explosives-contaminated waste material and debris.

This Sampling and Analysis Plan (SAP) and closure process description have been prepared to support closure activities for the EWSF.

2 Closure Process Description

In general, the closure of an EWSF magazine will consist of the decontamination of structure surfaces. The presence of contaminated soil is considered unlikely because of the design and the operation of the unit as described in this permit application. Core samples through the asphalt or concrete surfaces near the entrances to the units will be collected, where applicable, to verify contamination. Concrete core sample analysis testing methodology, scope of analysis, and laboratory detection limits shall be pre-appproved by DTSC before initiation of closure activities. Background soil samples will be taken around the units to establish concentrations of constituents. The number of samples to be taken will be based upon proper statistical representation of the EWSF area but will be a minimum of five samples.

The non-porous structure surface areas to be decontaminated will be swipe-sampled to confirm successful decontamination. Detailed wipe sampling procedures, including the type of filter paper and solvent to be used, analysis testing methodology, and laboratory detection limits shall be pre-approved by DTSC before proceeding with closure. All surfaces that are determined to be contaminated based on the results of the verification sampling and analysis program will be decontaminated or excised.

The specific closure activities will be as follows:

1. Using knowledge of the waste constituents managed at the unit (**Table A.2-1**), select several parameters indicative of wastes managed historically (that is, explosives, metals, solvents, oils, inorganics) for inclusion in the verification sampling program. See **Table A.2-2** for the list of parameters.
2. Collect a minimum of five grab samples of water from the water bib or hydrant that will supply water for decontamination efforts.
3. To establish background levels, collect a minimum of five core samples of soil from a location near the EWSF but one that is not associated with hazardous waste

management activities. (Note: Soil samples in specific locations may not be required if adequate background data are available.)

4. Analyze the grab samples of water and the core samples of soil for the parameters selected in Step 1. Calculate the mean and the standard deviation for each parameter.

5. Decontaminate the surfaces in each unit by using a hydroblaster or a steam cleaner. Hydroblasting may be accomplished by using appropriate cleaning agents (such as detergents, chelating agents) or water alone. Steam cleaning may be accomplished using similar substances. **Table A.2-3** summarizes the decontamination methods and the cleaning agents that may be used for each of the various groups of contaminants that may be encountered. The decontamination method selected from **TableA.2-3** will be based on the types of contaminants anticipated.

6. Collect the wastewater (decontamination and rinse solutions) generated by decontamination efforts. The wastewater will be removed by creating a temporary containment and by using an auxiliary pumping system to pump the collected wastewater into a portable tank. Residual liquid will be removed with absorbent material that will be collected and placed into appropriate container(s). The absorbent material will be handled as appropriate, based on the analytical results of the sampled wastewater.

7. Grid the decontaminated floor and shelving of each unit (five magazines and Building 816) into equivalent size areas as indicated in the table below, relative to the surface area. Collect at least one swipe sample of 100 cm^2 in the center of each of the grid areas in each magazine. In addition, collect at least one swipe sample from areas where spills are known to have occurred, low spots, places where the membrane liner has failed, and other areas where waste or contaminated liquid may have accumulated during the operating life of the unit. Document the sample locations on a map or a schematic drawing of the unit. Areas where visible damage, cracks, and/or staining in the floor sealant are evident will be sampled by coring or chipping at that location.

Location	Approximate Dimensions (ft)	Approximate Number of Grids
Magazine 2	22 x 16	4
Magazine 3	12 x 11	2
Magazine 4	12 x 11	2
Magazine 5	15 x 10	2
B-816	27 x 38	12

8. Analyze the samples for the parameters identified in **Table A.2-2** that lists the parameters and the sampling and analytical methods.

9. Consider the parameters present on the samples at levels greater than the background levels, non-detect levels, and/or limits based upon a health risk assessment or greater than characteristic waste criteria to be indicative of residual surface contamination and the need to repeat decontamination efforts at the affected, documented sample location. Consider the parameters present on the samples at background levels, non-detect levels, and/or limits based upon the health risk assessment or below the

characteristic waste criteria to be verification of effective decontamination and clean closure for those parameters; thus, additional analysis and subsequent decontamination would not be required. Swipe analysis results will also be compared to the water supply samples to determine whether residual contamination detected is from waste management efforts or is an artifact of the water supply used for decontamination. Core/chip samples from areas exceeding the decontamination level after upon repeated decontamination efforts to determine extent of contamination.

If analyses of any core samples indicate hazardous chemical residues, they will be compared with applicable background data to determine if there is an impact to underlying soil.

10. After verifying the clean closure of interior surfaces, sample and analyze all collected decontamination and rinse solutions for proper disposal. Collect at least one sample for every 500 gal and composite the discrete samples. **Table A.2-4** provides an estimate of quantities of waste to be generated during decontamination activities.
11. A minimum of one core sample will be collected for each magazine (M2, M3, M4, M5, and M816), and from the sediments in surface drainage ditches close to, and down gradient from, the point where drainage from the apron in front of the magazines enters the drainage ditch. Soil samples will be collected using appropriate drilling methods at the following intervals: 0 to 4 in., and at 1, 2, 5, and 10 ft below the soil surface.
12. A minimum of one asphalt or concrete core sample will be collected near the entrance to each unit. The sample locations will be in the drainage path from the magazine and sited as close to the magazine as practicable. These samples will be compared to levels established by background soils sampling in the EWSF area.
13. Analyze the core samples for the parameters indicated in **Table A.2-2**, which lists the parameters and the sampling and analytical methods.
14. Compare the soil sample analytical results to the established background soil analytical results to determine whether residual contamination detected is potentially from hazardous waste management activities.

The specific sampling and analysis methodology and quality assurance (QA) and quality control (QC) measures are described in **Section 3** of this Appendix.

All personnel who participate in closure activities at the EWSF will have appropriate training to perform the assigned tasks. Any contractors or their subcontractors, as part of the contract requirements, must also provide evidence of training employees to perform hazardous waste management activities.

3 Sampling Procedures

All sampling will be performed by personnel trained in U.S. Environmental Protection Agency (EPA) environmental sampling techniques for sampling. The sampling team will consist of personnel from the LLNL Environmental Protection Department or contractors who are experienced in these sampling methods. Sampling personnel will follow health and safety

procedures and wear the appropriate protective clothing specified in the *Site Safety and Health Plan* (**Appendix IX.B**).

3.1 Sample Collection Procedures

The following samples will be taken prior to or during closure:

- Baseline soil samples external to the hazardous waste storage areas
- Soil samples near the units and within surface drainage areas
- Swipe samples of the floor and shelf surfaces to confirm clean closure
- Swipe samples of the epoxy-sealed foundations, external to hazardous storage operations to establish background characteristics
- Core/chip samples of the concrete, external to hazardous waste storage operations to establish background characteristics
- Concrete core samples of the floor in areas of known spills, visible damage, etc., samples of the epoxy-sealed foundations, external to hazardous waste storage operations to establish background characteristics
- To establish background values for contaminants, samples of the water supply to be used in decontamination activities
- Samples of decontamination waste to determine waste disposition.

The sealed foundations will be decontaminated and sampled. However, if contamination is still evident after repeated decontamination efforts and verification sampling, the structure and/or media will be removed.

Soil samples will be collected from sediments in the surface drainage ditch as close to, and down gradient from, the point at which drainage from the apron in front of each magazine (M2, M3, M4, M5, and M816) enters the drainage ditch.

The following sections describe the procedures to be followed in collecting samples:

3.1.1 Swipe Sampling Procedures

After decontamination is performed, all surfaces will be swipe-sampled to determine whether any residual contamination is present. If contamination is detected, the affected area will be decontaminated again and swipe-sampled again to confirm clean closure. Swipe samples will be taken as follows:

1. The floor and shelves of each magazine will be divided into equal-size areas as indicated below. At least one swipe sample of 100 cm^2 will be taken in the center of each grid area. Swipe samples will also be taken at each location where a spill is known to have occurred (based on operational history), in low-lying areas within the structure where liquids may have accumulated.

APPENDIX IX.A-3
SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR THE EXPLOSIVE WASTE TREATMENT FACILITY (EWTF) CLOSURE

APPENDIX A-3. SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR THE EXPLOSIVE WASTE TREATMENT FACILITY (EWTF) CLOSURE

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APPENDIX A-3. SAMPLING AND ANALYSIS PLAN AND CLOSURE PROCESS DESCRIPTION FOR THE EXPLOSIVE WASTE TREATMENT FACILITY (EWTF) CLOSURE

1 Introduction

The Site 300 Explosive Waste Treatment Facility (EWTF) is used to treat explosive hazardous waste. The hazardous waste include explosives requiring detonation; waste explosives; wastes from explosives collection systems; and explosives-contaminated waste material and debris.

This Sampling and Analysis Plan (SAP) and closure process description have been prepared to support closure activities for the EWTF.

2 Closure Process Description

In general, the closure of the EWTF will consist of removing the gravel detonation pad at the Open Detonation (OD) Unit and the decontamination of structure surfaces of the Open Burn (OB) Unit. The presence of contaminated soil is considered unlikely because of the design and the operation of the EWTF units as described in this permit application. However, samples of the soils surrounding each EWTF unit will be collected prior to the initiation of treatment efforts and during closure to verify the absence of contaminated soils. Core samples will also be collected from beneath the detonation pad of the OD Unit and the foundation area of the OB Unit. Concrete core sample analysis testing methodology, scope of analysis, and laboratory detection limits shall be pre-appproved by DTSC before initiation of closure activities. **Figure A.3-1** indicates the proposed sampling locations.

The non-porous structure surfaces, such as the steel burn pan and burn cage in the OB unit, to be decontaminated will be swipe-sampled to confirm successful decontamination. Detailed wipe sampling procedures, including the type of filter paper and solvent to be used, analysis testing methodology, and laboratory detection limits shall be pre-approved by DTSC before proceeding with closure. The OB unit foundation will be inspected for damage, visible staining, etc. Specific areas of the concrete foundation around the burn cage and burn pan will have been previously coated with impermeable material. These areas will also be swipe-sampled after decontamination. In addition, core sampling of the foundation will be performed if repeated decontamination efforts are unsuccessful or in areas where damage is evident.

Random core sampling of the foundation will also be conducted to verify decontamination. All surfaces that are determined to be contaminated based on the results of the verification sampling and analysis program will be decontaminated further.

The specific closure activities of the Units are described in the sections below.